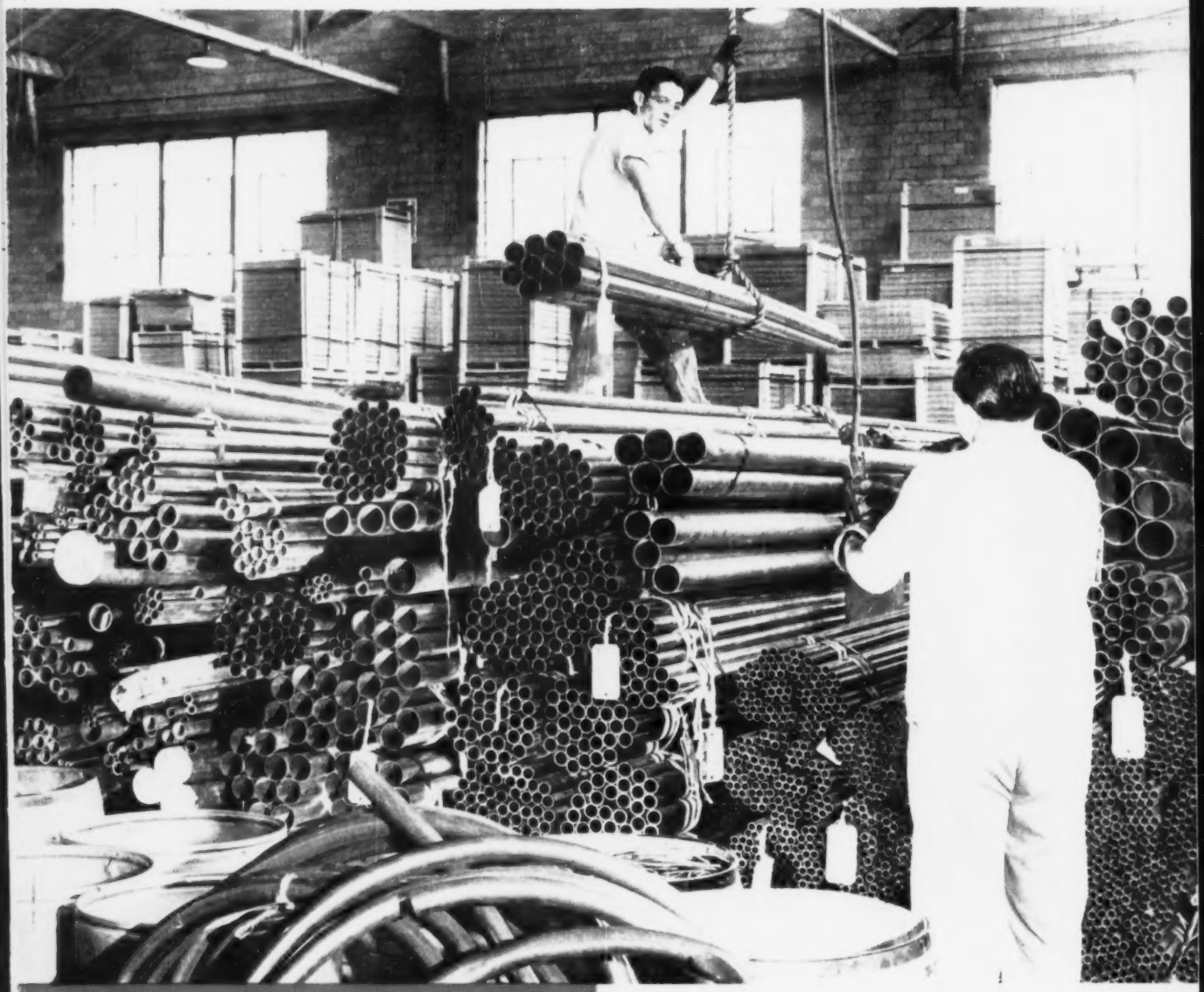
The IRON AGE

September 5, 1957 A Chilton Publication The National Metalworking Weekly



More For Your Copper and Brass Dollar P. 115

What Union Leaders Will Demand Next — P. 67

Time to Order Industrial Bearings — P. 160

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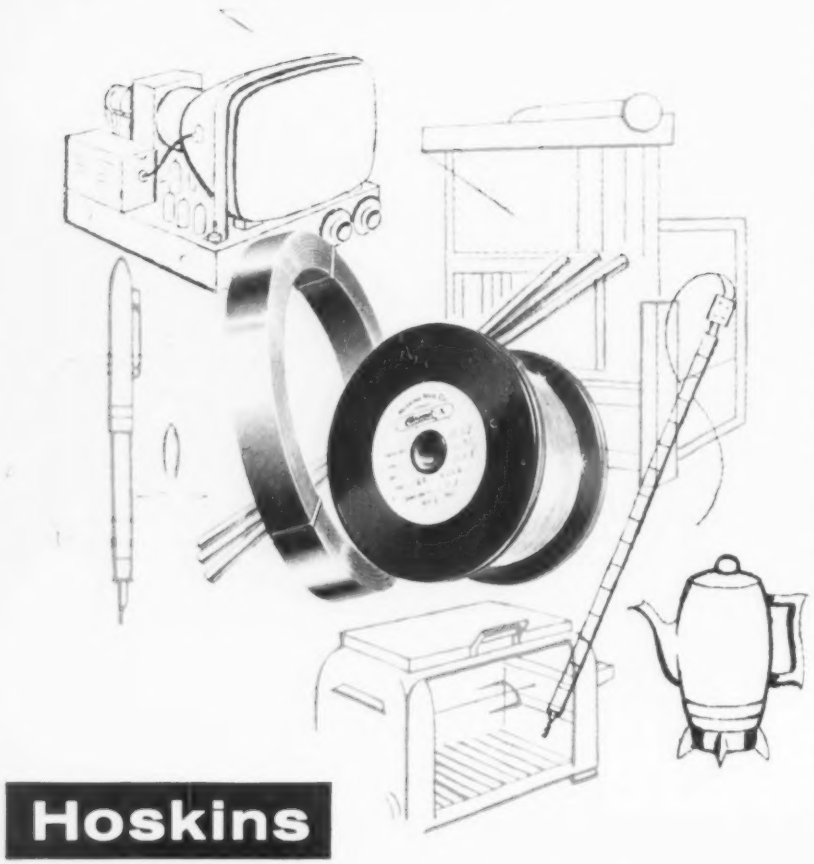

ALLOY 815-R: A new iron-chromium-aluminum alloy developed especially for use on precision resistor applications. Possesses high resistivity and low temperature coefficient of resistance, plus high strength, excellent ductility, and stability over a wide temperature range.

CHROMEL-C: A 60-16 nickel-chromium-iron alloy widely used in small heating appliances and cold resistors where high resistances are required within limited space. Its stability and uniformity minimize design variables, permit more efficient production of better units at lower cost.

CHROMEL-ALUMEL: The most accurate and most durable base metal thermocouple alloys ever developed. Made exclusively by Hoskins, they are the accepted standards for controlling heat treating operations up to 2300°F. and for measuring temperatures of jet aircraft engines.

ALLOY 46: A gas-free nickel-iron alloy developed especially for use as a terminal material for power resistor units. It is readily "wetted" by enamel to produce a good bond, and its coefficient of expansion is very similar to that of enamels used for such applications.

CHROMEL-D: A time proven low nickel heating element alloy for controlled atmosphere furnace applications. Highly resistant to sulphur attack and preferential intergranular oxidation, it gives long-life service in the critical temperature range between 1500° and 1800°F.

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Life in a Vacuum—The special vacuum atmosphere life-test equipment shown above was designed and built by Hoskins for use in developing new heating element alloys which will give improved performance and dependable, long-life service in vacuum atmosphere heat treating equipment.

HOSKINS MANUFACTURING COMPANY

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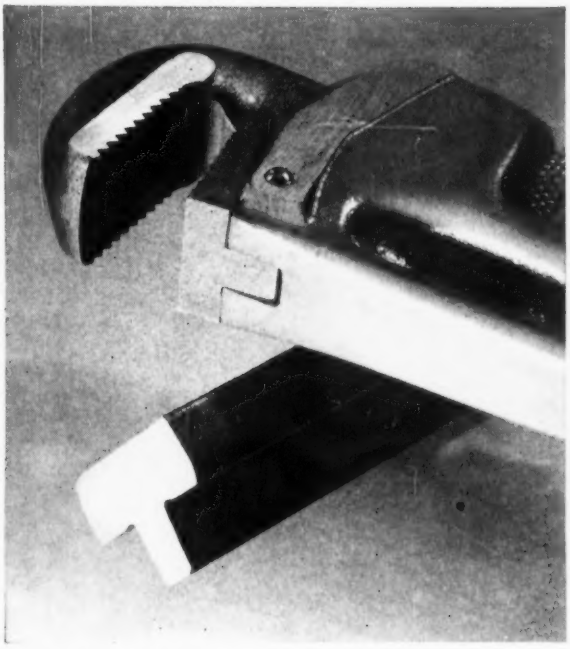
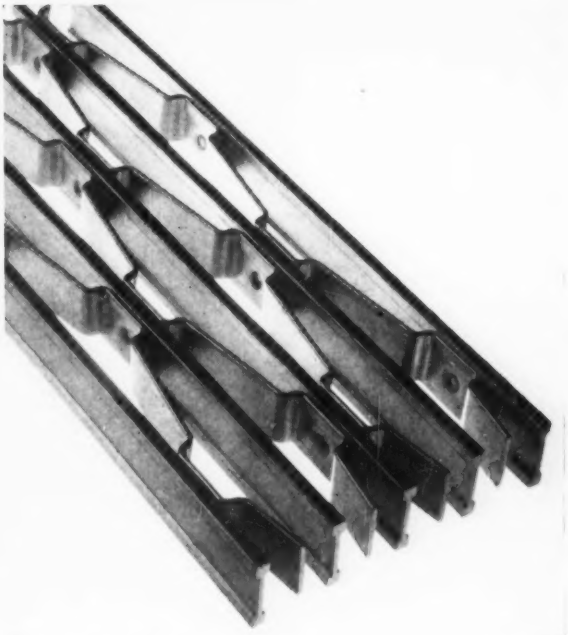


SLASHES COSTS—Heel-jaw T's for pipe wrenches made by an Ohio manufacturer were formerly forged alloy parts, individually machined. This was very costly. Now the customer uses rolled special sections. You can sometimes cut both material and processing costs by switching from individual forged parts to specially rolled bar lengths.



22 PCT STRONGER—Miniature I-beams, rolled by Bethlehem, are an important feature of a new type of welded floor grating. The Chicago manufacturer says "... these specially designed bars provide 22 pct more strength with 14 pct less weight than standard bars." Special sections allow you the flexibility to design a better product.

They do it better with special sections

BETTER CUTTERS—Two prominent midwestern manufacturers of mower equipment use Bethlehem-rolled sections for their cutter-bar wearing plates. They report that these sections make cutter bars more rigid, durable and easy to service. A *one-piece* section for the wearing plate is superior to a fabricated part. We also supply the knife-back steel.

• • • We urge you to consider the use of Bethlehem hot-rolled special sections. You may find ways to cut your costs and to improve your products. We'd be happy to work with you. Please contact the sales office nearest you.

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Indexed in the Industrial Arts Index and the Engineering Index.

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The IRON AGE

September 5, 1957—Vol. 180, No. 10

Digest of the Week in

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LABOR LOOKS AHEAD

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Meany, it's holding AFL-CIO together. Reuther wants the 32-hour-work week. McDonald must strengthen his position. Editor-in-Chief Tom Campbell analyzes the broad picture. P. 67

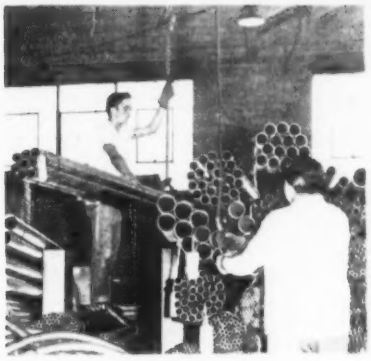
EXECUTIVE PAY

Steel Out Front—Survey by McKinsey & Co., New York management consultants shows steel companies pay their top executive more than the average of all industries. Steel firms also lead in number of deferred payment plans, and other fringe benefits. P. 75

SECOND MAN

Select Him Carefully — If the wrong choice is made when picking the second-in-command, the results can be disastrous when the boss is away. Here are eight basic qualities to look for in candidates. Sound selection takes time and careful thought. P. 76

Metalworking



READY FOR THE ASKING: These American Brass Co. warehousemen can make quick delivery on a wide range of brass stock. It's a matter of specifying the right alloy for the job at hand. Then it's wise to study how to get the best out of the versatile material. P. 115

TRANSISTORS

Sales Skyrocketing — Demand is so far ahead of supply for transistors and capacitors it will be nearly a decade before the sales curve levels out. Industrial, commercial and export markets wide open. P. 74

AUTO REPAIRS

Laxity Grows—An alarming 20 pct of cars on the highways are found to be deficient in one or more vital safety features. No tail lights and bad brakes are most common. Car owners need educating. P. 84

FEATURE ARTICLE

HOW TO GET MORE FROM COPPER AND BRASS

Place In Metalworking — From the engineering and economy standpoint, copper and its alloys have what it takes to assume a vital role in communications, electronics, automation, architecture and many other areas. How to specify this versatile material? This special feature in the continuing 'Metalworking Dollar' series sets down some hints on how to benefit from copper's many features. P. 115

SELECTION OF ALLOY

Key To Copper's Assets — In considering combinations of desirable properties, copper alloys have several features in which they predominate over other metals. For conductivity, both electrical and thermal, they're outstanding. Their corrosion resistance is excellent. On the decorative side they have pleasing color. The job of selection can be simplified by asking two questions: (1) What are the service requirements? (2) What processes will be used in fabrication? P. 116

HOW TO WORK

Many Techniques—By classifying copper alloys into three machinability groups, it is possible to come within a broad range of speeds, feeds, rake and clearance angles. Where forgings have a certain quality not obtainable by other means, they can be turned out in large quantities with modern presses. Sound castings can be produced regularly without the need of special equipment or extensive technical background. With so many different uses, there are joining methods to cope with every situation. P. 122

MARKETS & PRICES

TITANIUM MARKET

Comeback Planned — The cutback in titanium use by the military really hurt, but producers are still optimistic. They're banking on eventually developing large-scale commercial markets. P. 71

MAGNESIUM

Holds Market Gains—Other nonferrous markets are in the doldrums, but magnesium is sailing at a healthy clip. Growing demand for wrought products points to further growth for the industry. P. 73

WESTERN MARKETS

New Prospect List — Marketers looking for sales in the Farwest can use this rundown on new and expanding industries in the area. They're good prospects for metalworking supplies and service. P. 91

FALL UPTURN BEGINS

Steel Orders Rolling In — Flat-rolled steel demand is picking up, thanks to automotive buying. But volume is also increasing from miscellaneous buyers. The buildup should reach a climax in late November or early December. P. 159

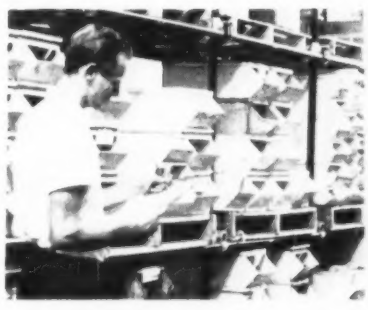
BEARINGS MARKET

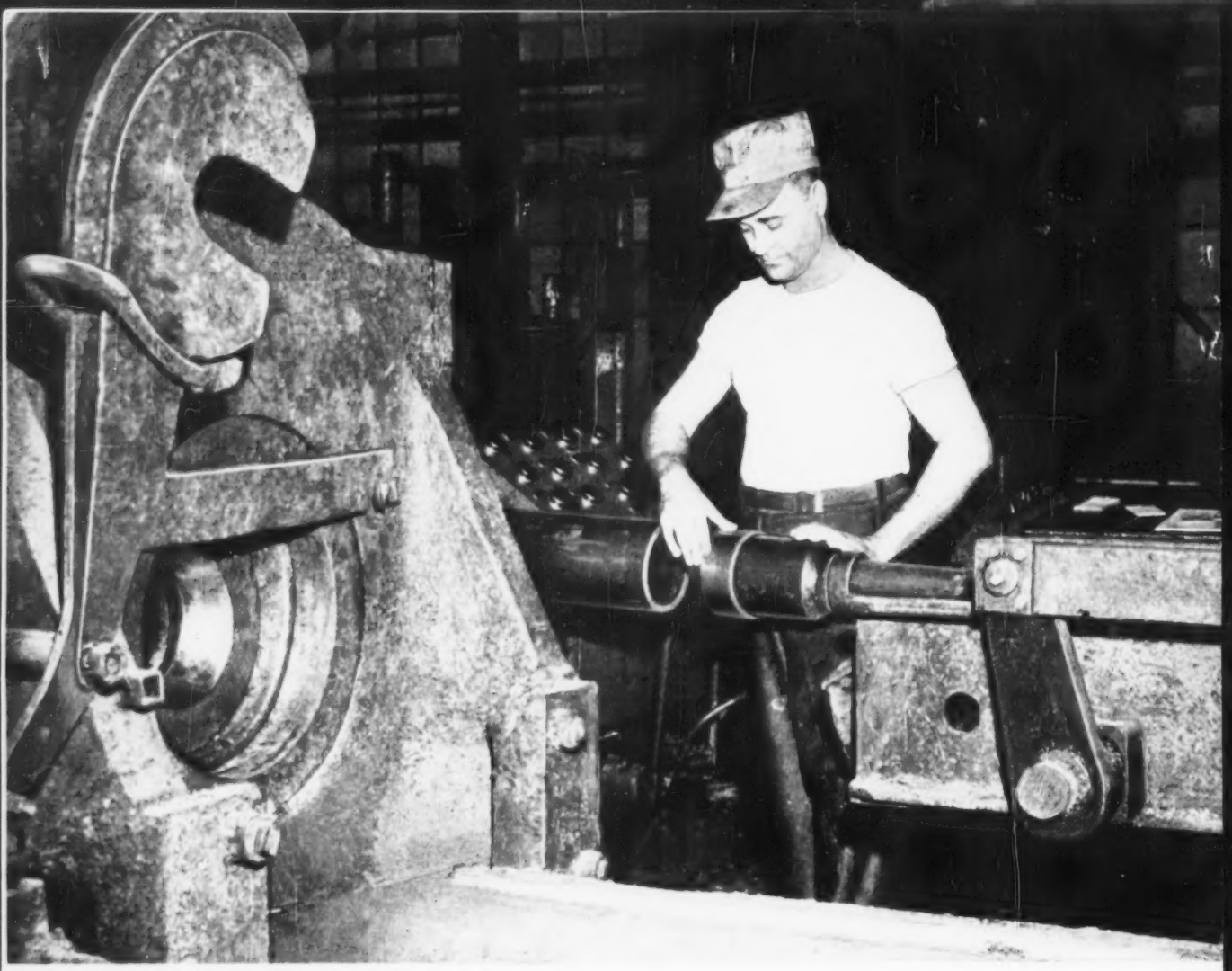
Price Rise Coming—Purchasing agents can save money if they place orders for bearings now. One major producer plans price hikes Oct. 1. Others will follow. But customers will have no trouble getting any type bearing in quantity. P. 160

NEXT WEEK

INVENTORIES

Know Your Costs—The first step in cutting inventory costs is learning exactly what they are. Next week's Special Report shows how some of industry's top inventory experts analyze their inventory costs and find out where excess can be trimmed.





COLD-DRAWN TUBES AND BETTER FINISHES

One of the many reasons why tubing is cold drawn is to obtain a better surface finish than it is possible to achieve as a hot finished tube. In the finishing of tubing by the cold draw process, any imperfection of the die or the mandrel is reflected in the product. Pick up on the mandrel, for example, can mar the inside surface of the tube.

Louis Friedel operates one of the many cold draw benches at B&W. Between every draw, his practiced eye makes sure his mandrel and die are in perfect condition. Years of experience in watching and making thousands of feet of B&W Cold Drawn Tubing enables him to exercise that judgment needed to tell what meets B&W's quality standards.

Many other men like Louis Friedel, generations of experience armed with the best equipment, put their knowledge into every foot of B&W Tubing. It's your assurance that the B&W Tubing you buy will meet your most exacting requirements. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

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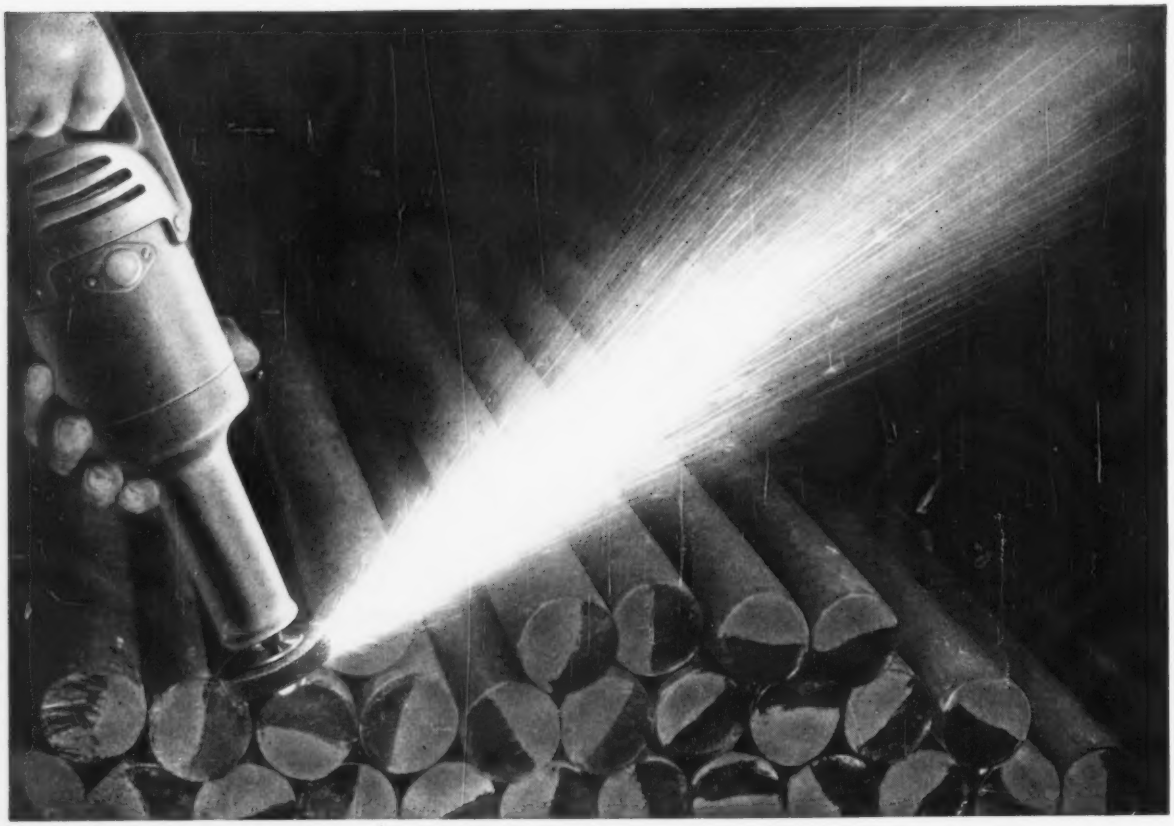

QUALITY CONTROL REPORT

These sparks reveal vital facts about quality control of steel

You are naturally interested in the quality of your finished products—and if you use steel in making them, you should know about the Ryerson quality controls symbolized by this spark test.

Here a skilled Ryerson inspector is checking the carbon content of a steel bar by "reading" the sparks thrown off by an abrasive wheel. It's an amazingly accurate method of making sure that you get exactly the steel you order.

And this is only one of many rigid quality controls that protect you in every purchase of steel from Ryerson stocks. For example, a heat symbol identifies every bar of alloy steel to avoid the problem of variation from heat to heat. Another example: cylinder tubing can be furnished to more accurate inside diameter through Ryerson specs controlling O.D. and I.D. instead of O.D. and wall.

The result: steel of certified quality—assured by exacting Ryerson controls, whether your product calls for carbon, alloy or stainless steels. And these quality controls become *your* quality controls in your finished product.

These are important points to remember when you specify or purchase steel. You get extra value every time you order from your nearby Ryerson plant.

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The People's Pendulum: It's Swinging Against Labor

Labor's leaders and friends will have a tough time staying the pendulum of public opinion over the next year or two. It will take all the common sense and character of AFL-CIO chief George Meany to remove some of the sting from disclosures made at the Senate racketeer hearings.

The hearings alone did not start the swing of the pendulum toward labor's head. For some time there has been an unconscious feeling among the average citizen that labor's power was too great. This had reached the workers even if it hadn't impressed some union leaders.

Does this mean that the public or Congress is going to rise up and smite labor a death dealing blow? Hardly. But it does mean that more workers and some top level labor people are revising their opinions on how far labor unions can go—unfettered by responsibility or control.

The next few years will tell the story. It is true that in a final count most rank and file workers will back the union rather than their employers. It has always been that way. But there comes a time when the union man is more the man-on-the-street than he is a dues paying automaton.

The racket disclosures along with highly questionable labor union practices will create a bigger impact than some people think. No one except a few unreconstructed conservatives wants to see labor in a strait-jacket. But even the most liberal citizen will soon want something that will prevent any union from getting a strangle hold on the nation—or on union members.

If you don't believe this, look back to the unprecedented vote a dark horse got in the recent steel union election. It was an outgrowth of a mass reaction against what some rank and file thought was a dictatorial handling of a dues increase and a pay increase for officers. If such a mild—in labor circles—set of factors could cause such a stink, imagine what a continuation of the McClellan hearing disclosures could produce for labor in general.

There is always the chance that labor's rank and file will react quite differently than most people think. That may be so in this case. But there is one thing you can be sure of: Top labor leaders are plenty worried.

And well they might be! We are entering the period when labor's unsurpassed power is on the wane.

Tom Campbell

Editor-in-Chief

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XactRAY PIPE WALL GAUGES for automatically sizing over- and under-size wall

INFRA-RAY WIDTH GAUGES for hot strip

INFRA-RAY DIAMETER GAUGES for hot rolled rod

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X-RAY-LE COMPUTERS Printed record of footage of strip within several tolerance ranges

SOLIDIFICATION POINT INDICATORS Speed casting operations

WEIGHT INTEGRATORS for conveyor belts

INFRA-RAY RELAYS for automatic actuation

LOAD RELAYS Sensitive and easily adjusted

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I G C

INDUSTRIAL GAUGES CORPORATION

WEST ENGLEWOOD NEW JERSEY

Indispensable Man

Sir—Your editorial in the Aug. 8 issue, "Indispensable Person—Lucky If You Have One," was very good. It is interesting and thought provoking and I think will do some of our executives good. You might send me a half-dozen tearsheets for them.—A. H. Frauenthal, Chairman of the Board, The Kaydon Engineering Corp., Muskegon, Mich.

Four-Day Week

Sir—The Automotive News column in your Aug. 8 issue discusses Walter Reuther's demand for a 4-day work week, intimating that it is very likely a trade or bargaining item. Even so, the idea is appalling in this day of overall labor, technical, and scientific manpower shortages. I believe some strong editorials on this subject are in order.

May I suggest that we stop talking about millions of dollars in overtime to keep up present production. Instead, point out that a 4-day week is equivalent to a loss of 10 weeks' production, one fifth of the work year. This is a figure everyone can remember.

Counter Offer — However, management and industry can win nothing with a negative approach. They must be prepared with counter suggestions. I say the 40-hour week has worked well for years, why change? The unions demand more leisure for the workers, and they will eventually win, so I say give in a little now, but not on the 40-hour week. Start with the holidays. Those Mondays preceding and Fridays following Tuesday and Thursday holidays are notorious for absenteeism and low production. Adding them to the paid holidays would get rid of a management headache and make a big hit with the labor rank and file.

Then consider additional paid vacation time. Think how much less one or two weeks' vacation (in addition to the now traditional two weeks) would cost compared to the cost of a 4-day week. Companies, such as General Motors, Union Carbide and others, which now have extra vacation time tied in with length of service, find it of great assistance in engendering company loyalty and reducing expensive labor (and also salaried) turnover. With more than two weeks at their disposal employees can be encouraged to split up their vacations.

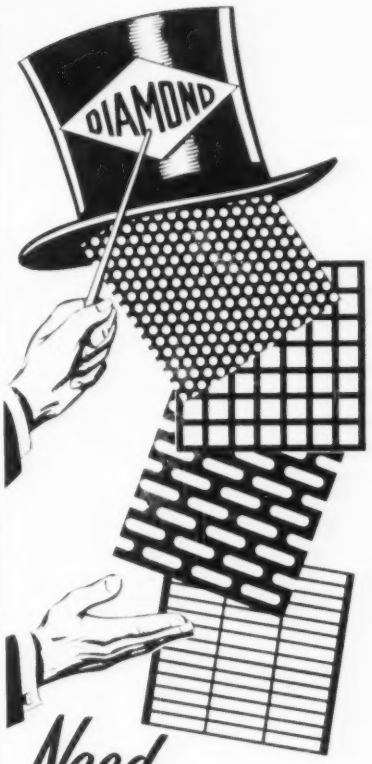
I predict that the first company to try the above approach will win a quick settlement and reap a big bonus of employee good will.—J. R. Funk, Fullerton, Calif.

Business Success

Sir—Would you please send us three copies of the special report "Success in Business Takes More Than Urge to Get Ahead" by Benjamin F. Fairless in your July 4 issue.

We found this article interesting and quite informative.—W. S. Hegler, Superintendent, Steep Rock Iron Mines Ltd., Steep Rock Lake, Ontario, Canada.

"I'm not a drifter! I've been located on this corner for years."



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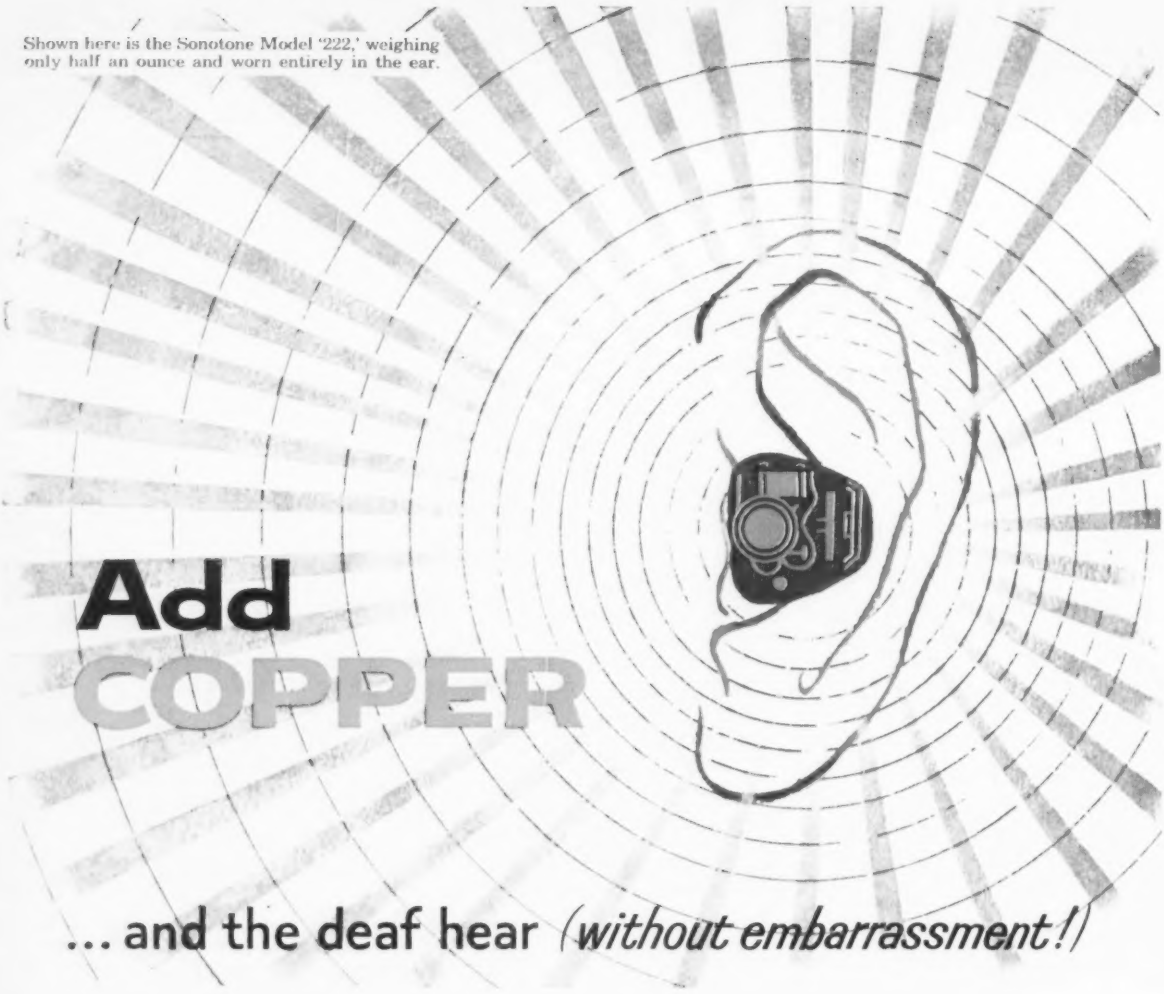
Shown here is the Sonotone Model '222,' weighing only half an ounce and worn entirely in the ear.



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... and the deaf hear *(without embarrassment!)*

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For other examples of miniaturization, write to the Copper & Brass Research Association, 420 Lexington Ave., New York 17

FATIGUE CRACKS

Calls His Shots

For 20 years IRON AGE readers have kept a box score on Tom Campbell's steel labor predictions. His batting average is somewhere around .800. Among other things, he has predicted many steel wage raises since 1937 within a cent or two of the final settlement. In at least five cases he hit it on the nose.

The same score applies to the record on price change forecasts.

Campbell reports on labor

But, more important than that, as a labor reporter he has always felt that it was his responsibility to tell you what was going to happen before, not after, the fact.

Penalty of Accuracy—This has put him in trouble with top officials on both sides. It has produced quarts of sweat. But the results are worth it. One time to remember is a tough strike in the middle 40's. This case went to the White House. The strike was on. Meetings were tense. In a story written on Monday and released Wednesday, Tom predicted:

The strike was over and men would go back to work the following Monday. The wage increase was 18.5 cents an hour and prices were going up $5 a ton.

He, and the rest of the staff, sweat that one out while newspapers all over the country were carrying this IRON AGE exclusive—along with no comment from the late Phil Murray or the White House or U. S. Steel.

Finally, at 4:30 p.m., Friday, two days after the IRON AGE story, President Truman took Tom partly off the hook with a $5 per ton steel price announcement. At 10:30 that night Phil Murray made him a completely honest man with an 18.5 cents per hour wage increase.

Last summer Tom came closest of 30 newsmen in predicting the outcome of the negotiations. His prediction: Six weeks strike; 20 cents an hour with a 3-year contract.

It turned out to be 20.3 cents, 3-year contract, and five weeks strike.

For his latest predictions see p. 67.

Copper "Dollar"

Copper is a "many-sided" metal. And it rightfully deserves that title. When it's alloyed with other elements, it takes on even more facets.

What makes copper and its alloys such a vital group among the commercial metals? It has what designers look for, what engineers need, what craftsmen admire. In conductivity, both electrical and thermal, it's hard to beat. Workability—generally excellent whether you work it hot or cold. The coppers and brasses are well known also for their corrosion resistance. And so goes the story property after property.

In spite of its individual properties, copper's real assets lie in its combinations of properties.

That's the theme of this week's special feature—How to Get More for Your Copper and Brass Dollar. The hints and tips start on p. 115.

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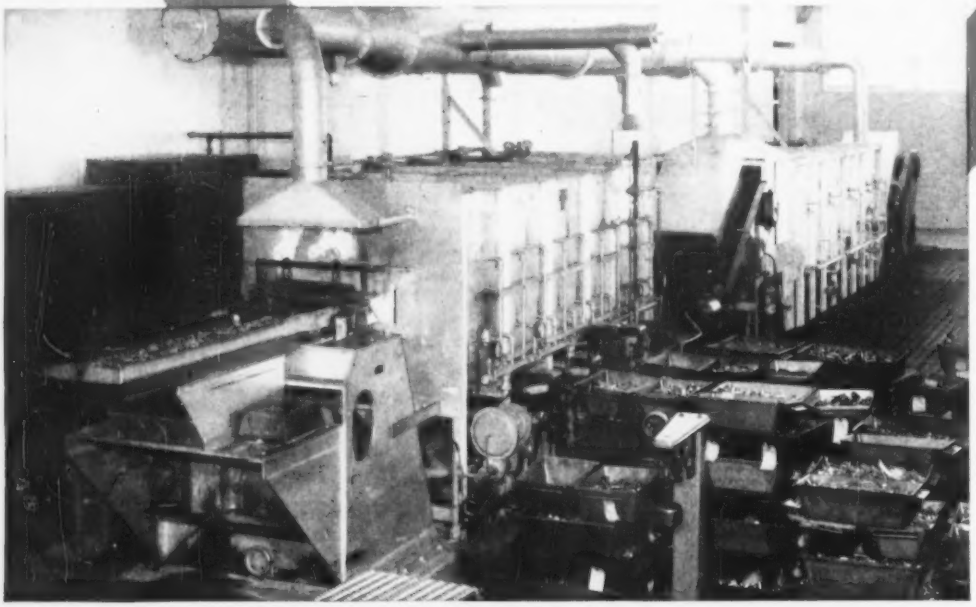

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EXHIBITS, MEETINGS

Packaging & Handling Show—Oct. 28-31, Atlantic City. (SIPMHE, One Gateway Center, Pittsburgh 22.)

AtomFair '57—Oct. 28-31, New York. (Atomic Industrial Forum, 3 E. 54th St., N. Y. 22.)

Metal Show—Nov. 2-8, Chicago. (American Society for Metals, 7301 Euclid Ave., Cleveland 3.)

SEPTEMBER

National Metal Trades Assn.—Eastern plant management conference, Sept. 8-11, Essex-Sussex Hotel, Spring Lake, N. J. Society headquarters, 337 W. Madison St., Chicago.

American Mining Congress—Metal mining and industrial minerals convention, Sept. 9-11, Hotels Utah & Newhouse, Salt Lake City, Utah. Society headquarters, 1200 18th St., Washington, D. C.

Society of Automotive Engineers—Tractor meeting and production forum, Sept. 9-12, Hotel Schroeder, Milwaukee. Society headquarters, 485 Lexington Ave., New York.

Instrument Society of America—12th annual instrument-automation conference and exhibit, Sept. 9-13, Cleveland Auditorium, Cleveland. Society headquarters, 313 Sixth Ave., Pittsburgh.

National Petroleum Assn.—Annual meeting, Sept. 11-13, Traymore Hotel, Atlantic City. Society headquarters, 958 Munsey Bldg., Washington.

Marking Device Assn.—National meeting, Sept. 19-20, Roosevelt Hotel, New Orleans. Society headquarters, 912 Chicago Ave., Evanston, Ill.

Steel Founder's Society of America—Fall meeting, Sept. 23-24, The Homestead, Hot Springs, Va.

(Continued on P. 16)

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Barrel Door
with quick-acting cam locks
Reduces opening and closing time by 90%. Prevents improper door replacement. This one feature alone can save $3.00 to $25.00 every day used.

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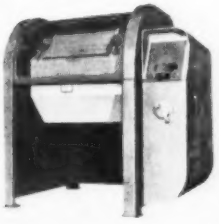

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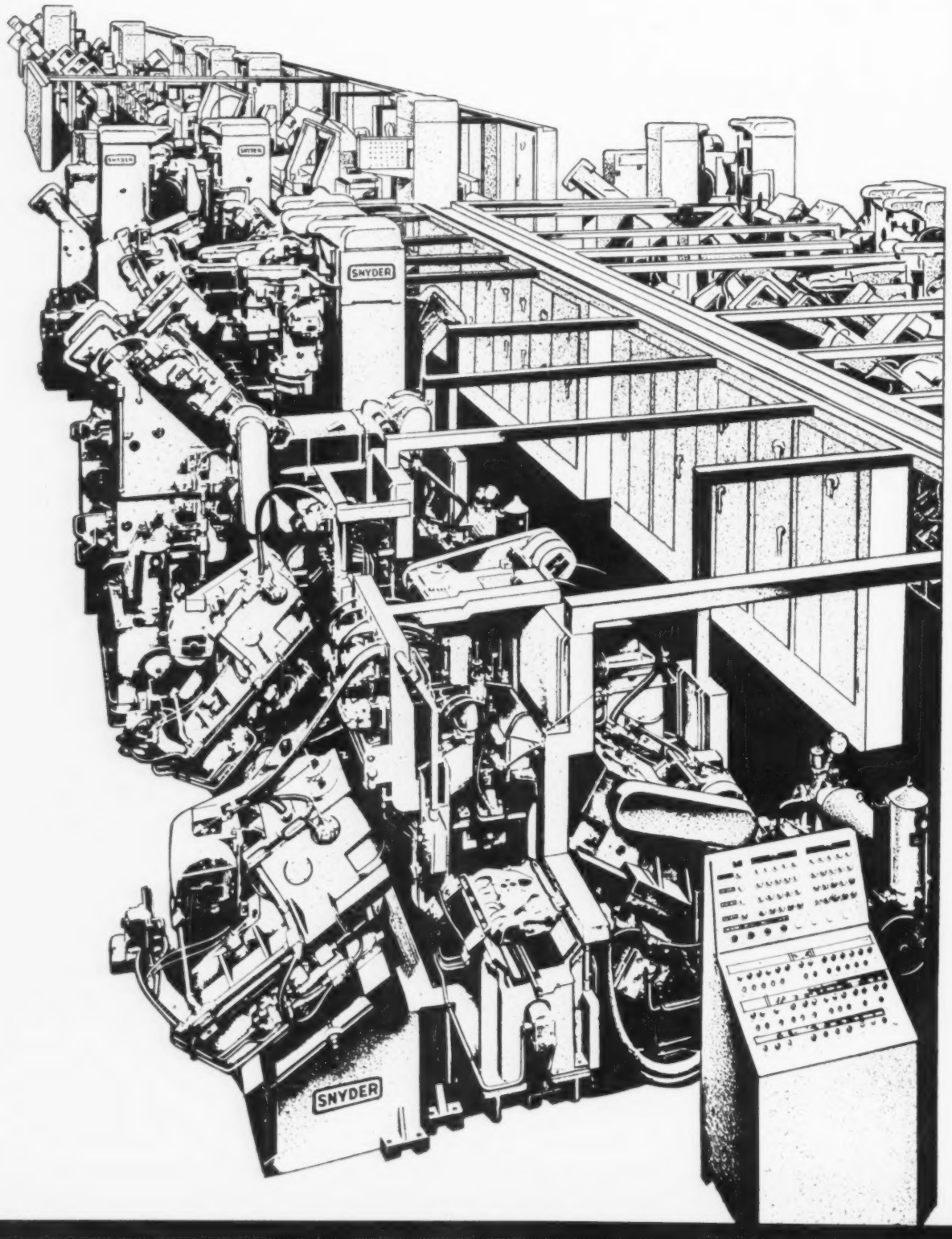

Transfer Machines Processes Either Castings from Rough to Finished Parts

Combination of two special transfer milling machines in parallel, with automation, feeding into one special transfer drilling machine gives production of 136 pieces per hour

Special Features of Snyder Machines Nos. 55-60 and 55-61

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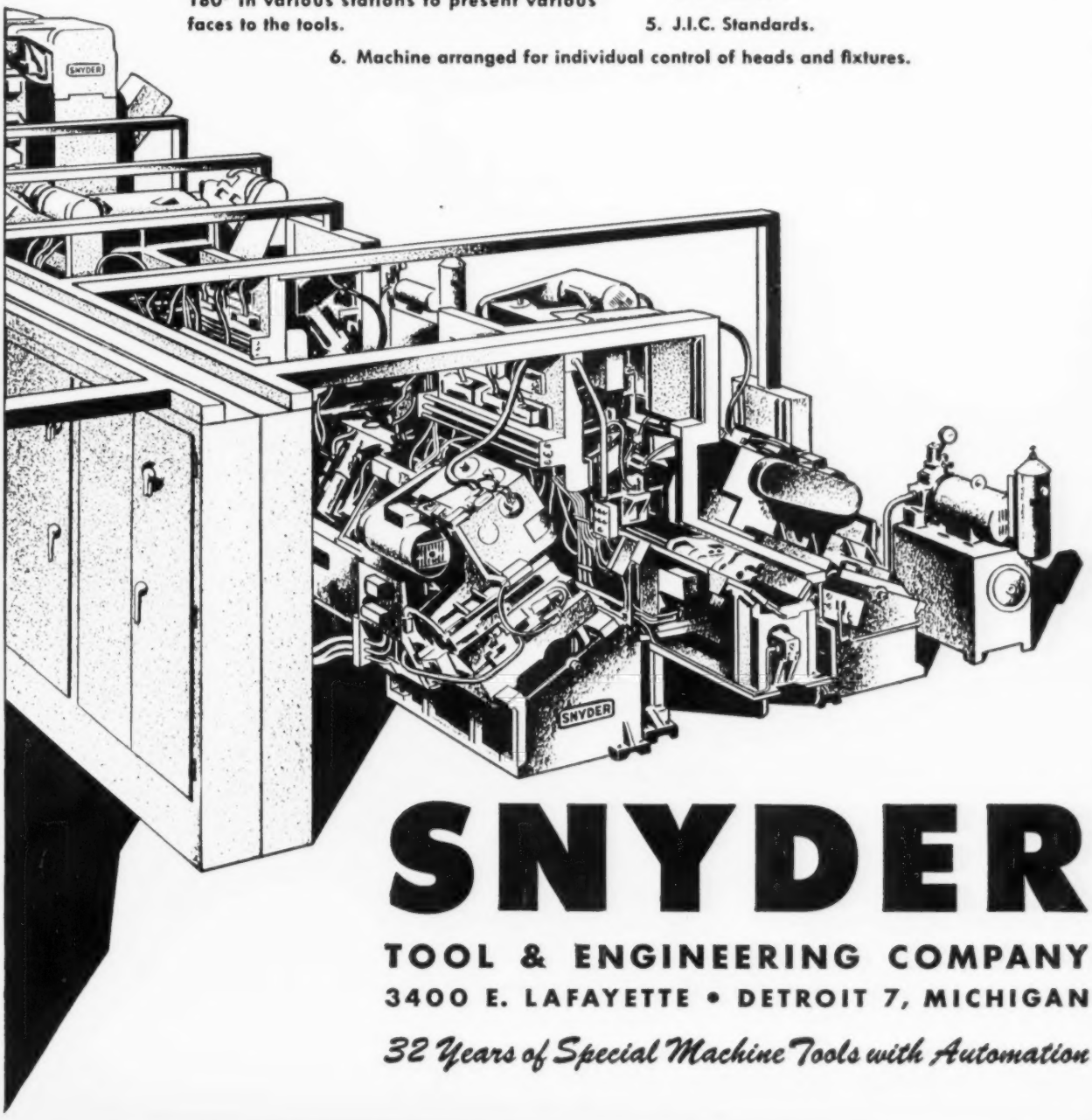

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EXHIBITS, MEETINGS

Continued from P. 13

Society headquarters, 606 Terminal Tower, Cleveland.

American Machine Tool Distributor's Assn. — Annual meeting on serving tomorrow's markets, Sept. 23-24, Hotel Cleveland, Cleveland. Society headquarters, 1900 Arch St., Philadelphia.

The American Society of Mechanical Engineers—Fall meeting, Sept. 23-25, Statler Hotel, Hartford, Conn. Society headquarters, 29 W. 39th St., New York.

Standards Engineers Society—Sixth annual meeting on standardization — economy through application, Sept. 23-25, Hotel Commodore, New York. Society headquarters, P. O. Box 281, Camden, N. J.

Assn. of Iron & Steel Engineers—Annual convention, Sept. 23-26, Penn Sheraton Hotel, Pittsburgh. Society headquarters, 1010 Empire Bldg., Pittsburgh.

American Hot Dip Galvanizers Assn.—Semi-annual meeting, Sept. 26-27, Netherland-Hilton Hotel, Cincinnati. Society headquarters, 1806 First National Bank Bldg., Pittsburgh.

OCTOBER

The Electrochemical Society — Semi-annual meeting, Oct. 6-10, Statler Hotel, Buffalo. Society headquarters, 216 W. 102nd St., New York.

American Institute of Steel Construction — 35th annual meeting, Oct. 6-11, Hotel del Coronado, Calif. Society headquarters, 101 Park Ave., New York.

American Society of Lubrication Engineers—Fourth conference, Oct. 7-9, Royal York Hotel, Toronto, Ont., Canada. Society headquarters, 84 E. Randolph St., Chicago.

Committee on Vacuum Techniques —Fourth annual symposium on high vacuum technology, Oct. 9-11, Hotel Somerset, Boston. Society headquarters, Box 1282, Boston.

Soft water saves wives

N. J. Cornwall, Ass't Gen. Manager, Tanks, Inc., manufacturers of galvanized water softener tanks.

This man saves money making water softener tanks with Sciaky Resistance Welding Techniques

Among wives, Norm Cornwall would be rated a wife saver, but at Tanks, Inc., he's a money saver because his production is smooth and almost completely trouble-free. And his manufacturing costs are so low that customers such as SERV i SOFT can offer their water softener rental service at really competitive prices!

Why don't *you* get the facts on how Sciaky resistance welding techniques can simplify your metal parts assembly and lower your unit costs at the same time . . . just as Mr. Cornwall did!

SCIAKY

You can read the details of this application on the next page . . .

SCIAKY

HELPS PUT PROFIT
INTO MANUFACTURING

The Economy of Seam Welding Galvanized Tanks in Limited Production

Questions frequently arise as to the practicality of resistance welding galvanized steel. However, Sciaky Resistance Welding Techniques have proved it can be done safely and economically.

The effect on zinc coating

In spot or projection welding the zinc coating remains intact when the correct Sciaky techniques are employed. In seam or flash butt welding the zinc on the outer surfaces is removed. However, the corrosion resistance is easily restored by coating the surfaces with a priming paint such as aluminum in the way Tanks, Inc., does it. The efficiency of the Sciaky resistance welding process more than offsets the extra painting operation.

Seam welding galvanized tanks

In the Franklin Park, Illinois, plant of Tanks, Inc., Ass't Gen. Manager, Norm Cornwall, has developed a simple but efficient process for joining bottoms to shells in the manufacture of galvanized tanks.

A single operator, employing Sciaky resistance welding techniques, inserts the bottom in the shell, welds it, and restores the protective coating at a rate of 55 per hour.

The manufacturing sequence

Figure 1 shows the first operation in which the operator drives the bottom into the shell with a hammer. In actual practice he performs this operation and the third operation while welding is in progress.

FIG. 1 Operator inserting tank bottom into the shell.

FIG. 2 Sciaky Seam Welder joins the bottom to the shell.

The second operation is the welding. The operator first makes a short (1") tack seam weld on the side of the shell opposite the longitudinal seam of the tank.

The tack welded assembly is then placed in the Sciaky welder and clamped in position by an air actuated fixture. The weld is started adjacent to the longitudinal seam of the shell and the operator helps it over this enlarged section. After this the welding proceeds unattended at a speed of 37.5" per minute with a spot spacing of 15 per inch. (See Figure 2). After completion of the full 360°, the operator allows the welder to continue and reweld over the longitudinal seam. This practice minimizes the danger of "leakers".

In the third operation the operator paints over the seam weld with aluminum paint to restore the corrosion resistance of the seam.

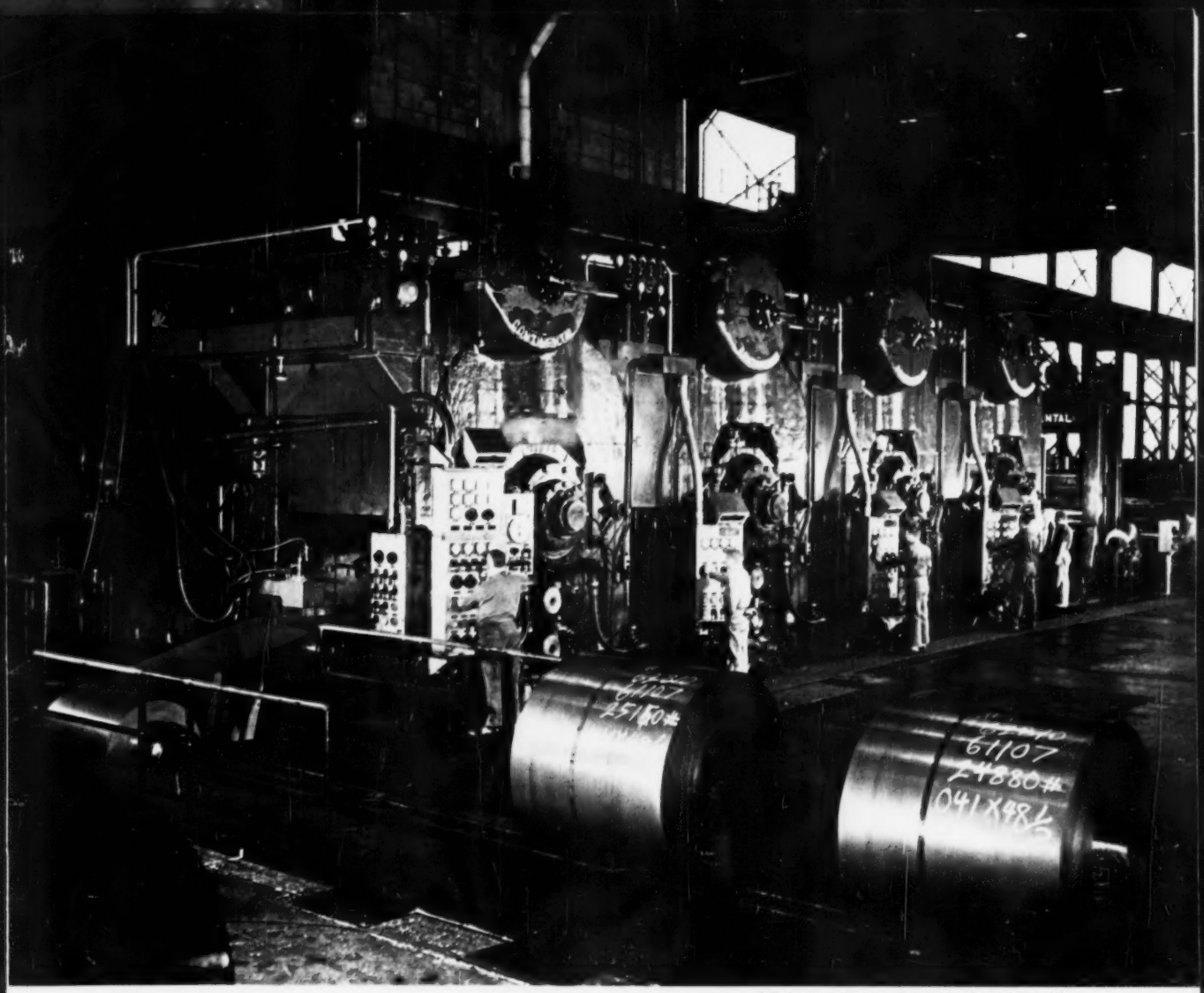
Information available

Case histories outlining the successful use of Sciaky Resistance Welding Techniques on galvanized material are available on request. An engineering report on resistance welding of galvanized steel is also available. Specific recommendations will be furnished on receipt of an outline of your requirements.

Write today, mentioning the information you would like to receive. There is no obligation. Sciaky Bros., Inc., 4932 W. 67th St., Chicago 38, Ill. POrtsmouth 7-5600.

DO YOU HAVE A RESEARCH PROBLEM?

Facilities of the Sciaky Research Division at Los Angeles, California, are available for contract research to answer resistance welding problems. Housed in a 15,000 sq. ft. building, these facilities include an experienced engineering staff, a complete range of the most advanced resistance welding machines including the largest in the world and a laboratory equipped for metallography, chemistry, electronics, photography and testing as applied to resistance welding. Write for further information and ask for the 20 page Research Division brochure.



60-inch, 4-stand tandem cold mill

BLAW-KNOX
COLD STRIP MILLS

Blaw-Knox designs and builds all types of cold reduction and temper mills for ferrous and non-ferrous work. Other Blaw-Knox equipment for the metals industry includes complete rolling mill installations including all auxiliary equipment for ferrous and non-ferrous metals, iron, alloy iron and steel rolls, Medart cold finishing equipment, carbon and alloy steel castings, fabricated steel plate or cast-weld design weldments, steel plant equipment, and heat and corrosion resisting alloy castings.

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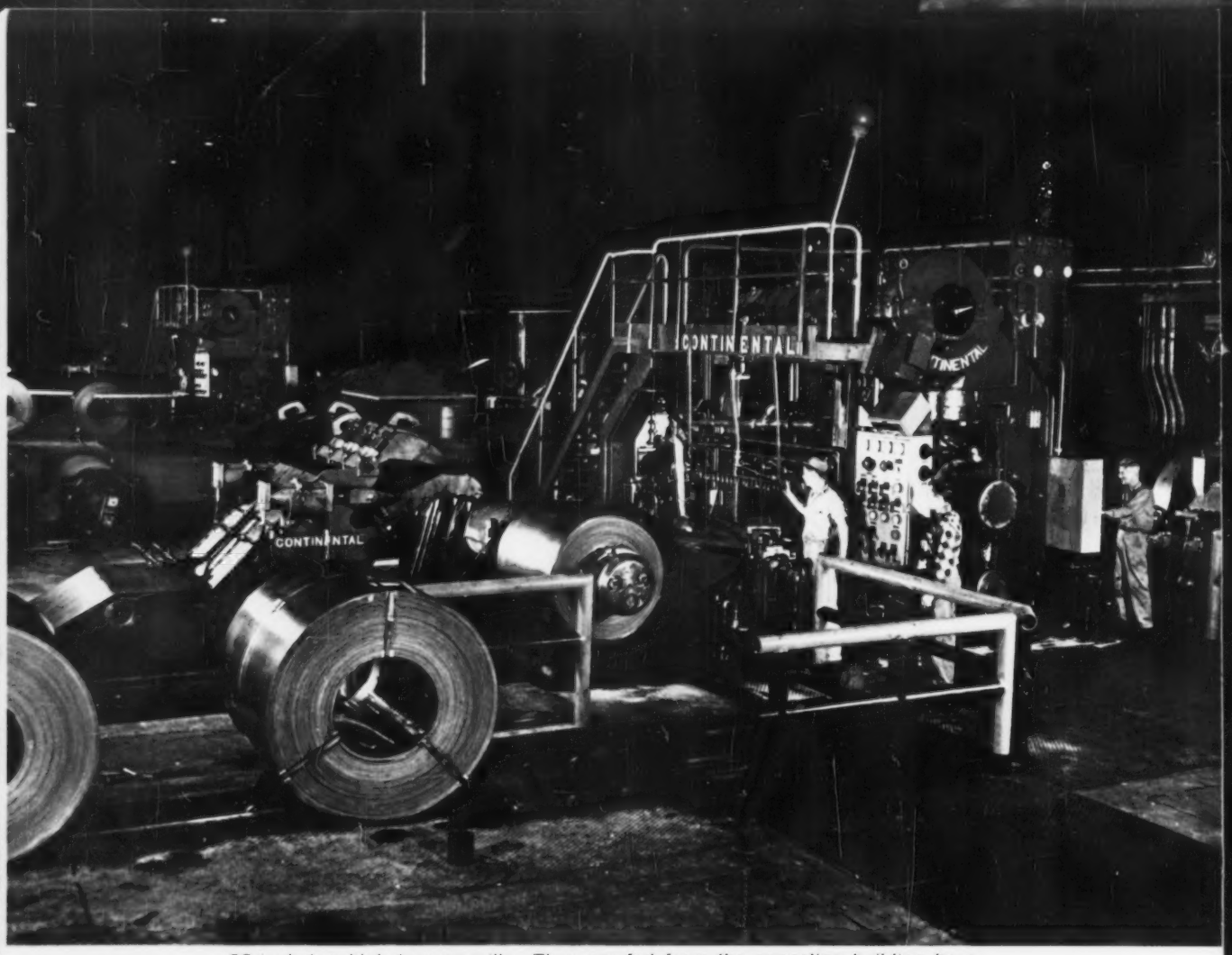

60-inch two-high temper mills. They are fed from the annealing building by a downender to floor level entry conveyor. Delivery conveyor is also at floor level.

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Blaw-Knox designs and builds a full range of Temper Mills for integration into your strip and sheet processing operation. Other Blaw-Knox equipment for the metals industry includes complete rolling mill installations including all auxiliary equipment for ferrous and non-ferrous metals, iron, alloy iron, and steel rolls, Medart cold finishing equipment, carbon and alloy steel castings, fabricated steel plate or cast-weld design weldments, steel plant equipment, and heat and corrosion resisting alloy castings.

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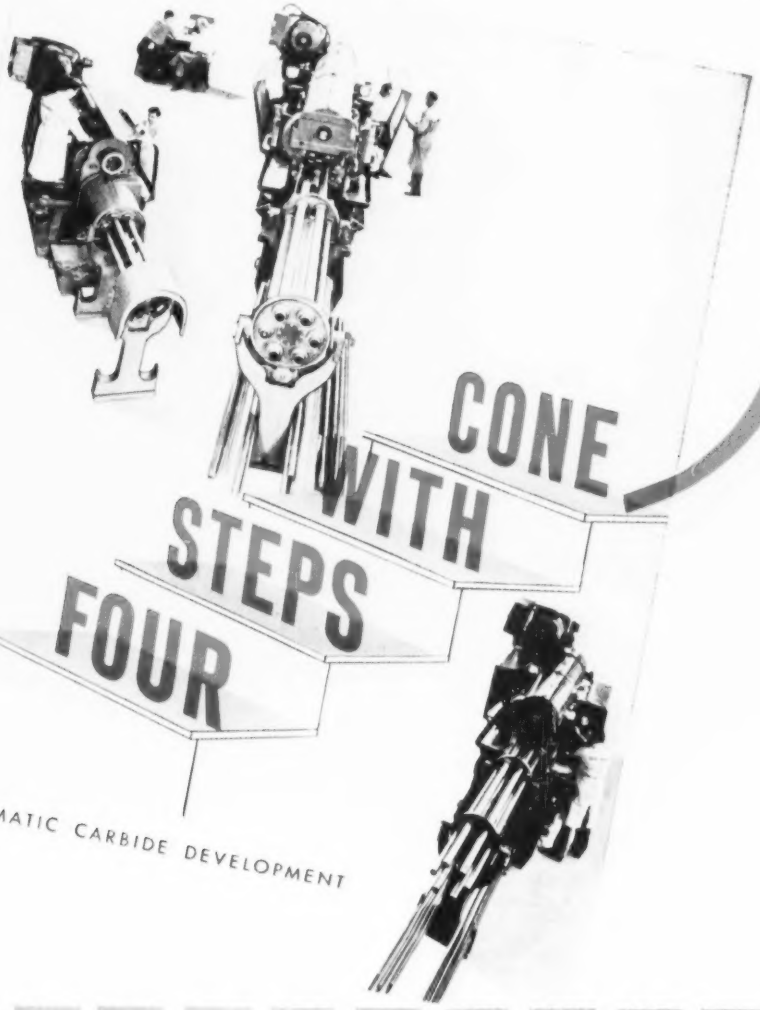

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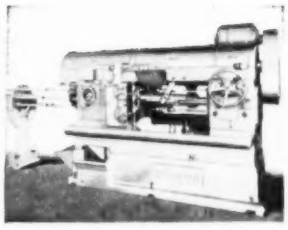

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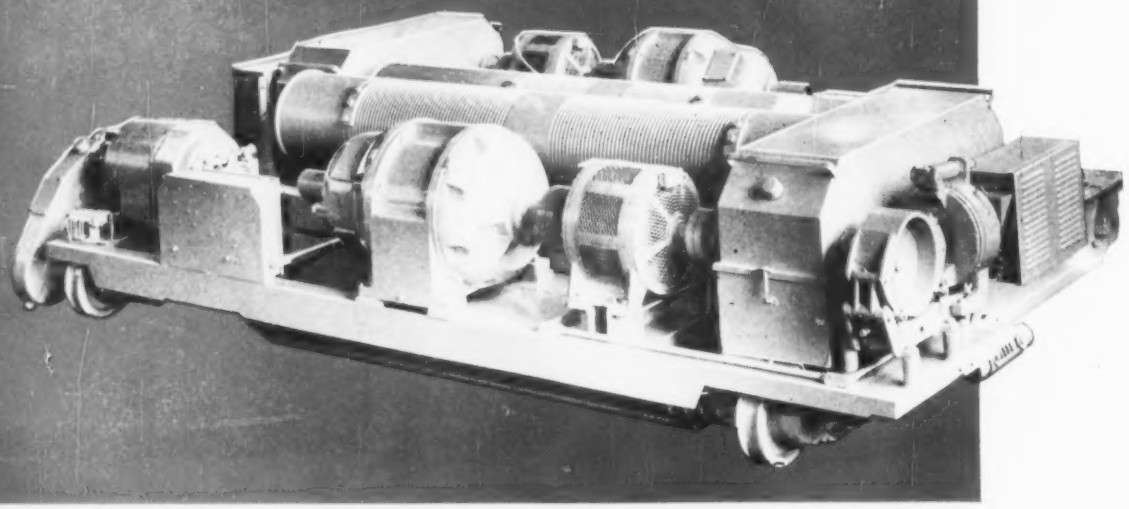

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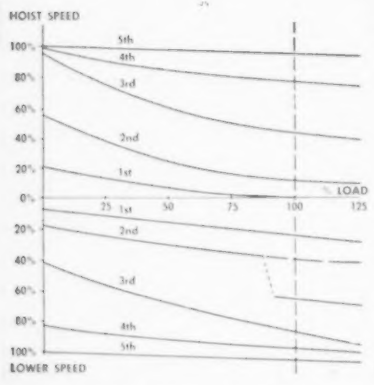

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The new simplified, smooth, accurate control for alternating current hoist motors utilizing full magnetic control combined with an eddy current brake. This improved control arrangement is easier to operate, easier to maintain, makes handling any load easier, safer, more accurate. Regardless of load the speed characteristics both hoisting and lowering are excellent, allowing smooth handling and accurate spotting of any load.

Standard control components familiar to all electrical maintenance and operating men are used throughout. Circuits are simple and readily understandable. No complicated electrical schemes. Used with a standard eddy current brake eliminating mechanical and electrical wear.

Excitation of the eddy current brake is automatically controlled by the motor speed allowing extra smooth acceleration. If fast acceleration is desired it may be obtained by moving the master switch to the last point, thereby eliminating the eddy current brake excitation. Off point braking is provided automatically to assist the motor brake in stopping the load. The motor brake is automatically applied in lowering if the eddy current brake excitation should be interrupted. Speed curves can be readily changed in the field, either up or down by a simple adjustment. When very heavy loads are handled extra lowering speeds are automatically provided.

For further information write to

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MOLY NEWS

CLIMAX MOLYBDENUM COMPANY, 500 FIFTH AVENUE, NEW YORK 36, N. Y.

Ultra-Strength Steels Boost Tensile Strengths to 300,000 psi.

Ten years ago, engineers considered 180,000-psi tensile strength in steels the maximum they could use safely.

Today, alloy steels with minimum strengths of 220,000 to 300,000 psi are being used commercially. These ultra-strength steels have the ductility and toughness needed for structural applications. At tensile strengths above 220,000 psi, they show more strength per pound of product than high-strength aluminum alloys. And at 260,000 psi, they are approximately 15% lighter than aluminum alloy products of the same strength.

Molybdenum is an essential element in almost all of these steels.

How are the higher strengths and strength weight ratios of these steels being used? Until recently, they've been utilized almost exclusively in aircraft components, such as landing gear. Now, however, they're being considered wherever weight and space savings compensate for higher fabrication costs . . . as, for example, in equipment that must be moved (portable tools); gears, pulleys, belts, liners; heavy machinery operating at high stresses; machinery where inertia is a design factor; materials-handling equipment, such as cranes; and transportation equipment.

Like to know more about ultra-strength steels and their properties, and the names of manufacturers? For our free booklet, circle #1 on the coupon.

Bulletin Shows How to Get Heat Resistance in Cast Iron

In cast iron, heat resistance can mean different things: resistance to growth, to heat checking, to scaling, or to deformation under load at high temperatures.

"Why Moly Iron? #5" contains a chart showing the specific kinds of heat resistance needed by parts such as brake drums, melting pots, piston rings and so on. This chart also lists the best type of iron to use and the proper alloy additions. A number of detailed case histories document this useful bulletin.

For a free copy of "Why Moly Iron? #5" circle #2.

New Coatings May Solve Moly's Oxidation Problem

The most important obstacle to using molybdenum at high temperatures is being overcome. Oxidation is the problem; at temperatures over 1000F, molybdenum oxidizes rapidly.

Newly developed coatings offer molybdenum the needed protection. Three types are promising:

1. Electro-deposited chromium and nickel layers which protect molybdenum to 2000F.
2. Sprayed coatings of aluminum-chromium-silicon alloys, and nickel-boron alloys, which have proved effective at 2000-2400F.
3. Ceramic and molybdenum disilicide coatings which hold promise of protecting molybdenum from oxidation at even higher temperatures.

Digested from "Protecting Molybdenum at High Temperatures" by Julius Harwood, Materials & Methods. For reprint of entire article, circle #3.

Booklet Deals with Molybdenum Joining Techniques

Recent progress in joining molybdenum, and suitable means for protecting it from oxidation, are opening up new uses for molybdenum and its alloys in structural components for high-temperature service.

"A New Look at Joining Molybdenum" by R. R. Freeman and J. Z. Briggs, both of Climax, analyzes the factors involved in joining moly and discusses the methods available.

For the free booklet, circle #4.

List of Moly Literature Now Available

Copies of more than 30 recent pieces of technical literature on molybdenum are available from Climax Molybdenum Company. *For a free list of these, including titles, authors, sources and 25-30 word summaries, just circle #5.*

Steels for Power-Plant, Refinery Equipment at 900-1100F

Designers of power-plant and refinery equipment who need to select steels for applications at 900 to 1100F will be interested in a copy of "Chromium-Molybdenum and Chromium-Molybdenum Vanadium Steels for power-plant and refinery service up to 1100F."

This paper, presented at the ASME annual meeting by George V. Smith, Bard Professor, Cornell University, appraises literature on the subject and draws some new, objective conclusions.

For a free reprint, circle #6.

New Climax Alloy Proves Unusually Wear Resistant

These liner castings, made of Climax 321, proved highly resistant to wear in our ball mill discharge launders. Severe wear normally occurs in this operation as a result of erosion from the coarse pulp flowing out of the ball mill discharge.

If you need a highly wear-resistant material, you may be interested in our new Climax 321 Alloy. It's a hard, martensitic type of white iron containing nickel, chromium and molybdenum in proportions that are well balanced, both metallurgically and economically.

We've been using 321 Alloy in our own mining operations with exceptional results. Comparative tests in ball mill liners and grinding balls proved its excellent wear-resisting properties.

Because this alloy is relatively new, service results in other applications are not yet available. However, our laboratory studies and data indicate it should prove suitable for the general run of abrasion-resistant castings of the martensitic white iron type—such as wear shoes, sand and dredge pump wearing parts, pug mill knives, mixer liners, etc.

Climax 321 can be melted in a cupola or electric furnace and cast in either sand or permanent (chill) molds. It has a normal hardness range of 55 to 62 Rockwell "C".

Composition: Carbon 3.30-3.60%; Silicon 0.30-0.60; Manganese 0.50-0.80; Nickel 2.75-3.25; Chromium 1.75-2.25; Molybdenum 0.70-1.10; Sulphur 0.15 max.; Phosphorus 0.30 max. *For data sheet, circle #7.*

Climax Molybdenum Company, Dept. 2
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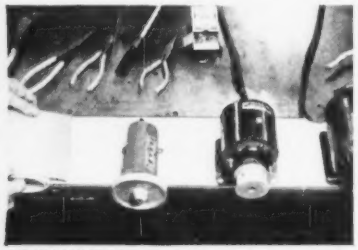
Look what you can do with it!

AUTOMATION on the production line: "SCOTCH" Brand Double-Coated Tape secures electrical coils to base plate through subsequent riveting, soldering and assembly.



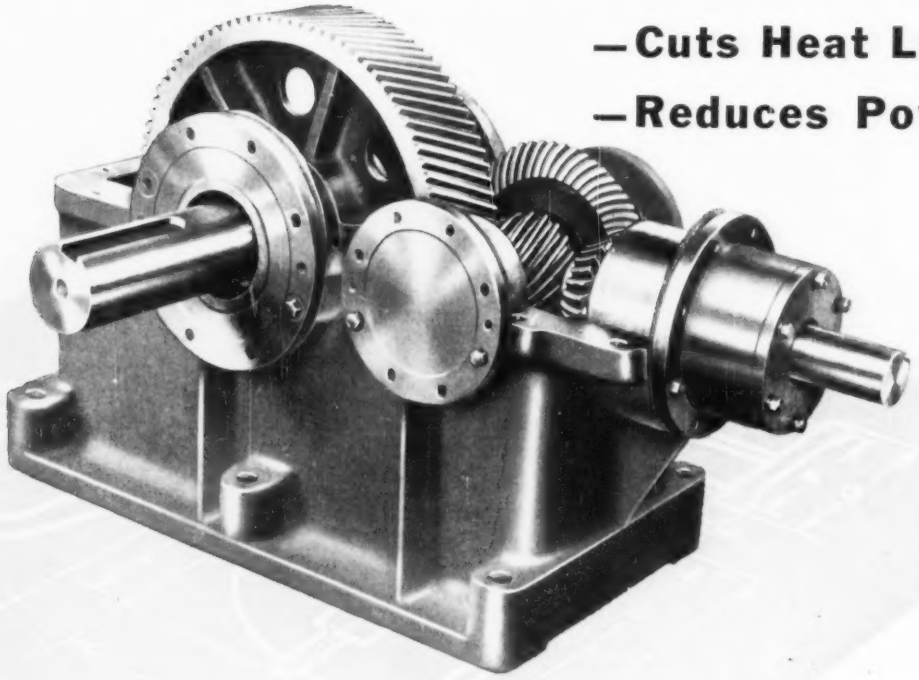
PRODUCTION can often be speeded with "SCOTCH" Double-Coated Tapes. Above: motors and generators held in place on test bench with double-coated tape. Tape eliminates bolting and unbolting of units.

BONDING, laminating, and splicing operations can often be speeded and simplified with "SCOTCH" Brand Dispenser H-125. Dispenser strips protective liner from tape; rolls it neatly; has built-in cutter.

FREE FOLDER shows many additional ways "SCOTCH" Brand Double-Coated Tapes can save time and money and solve production problems for you. Write on your letterhead to 3M Co., Dept. DE-97.

PRODUCT OF 3M COMPANY RESEARCH

Maximum Efficiency In Right Angle Drives



—Cuts Heat Loss

—Reduces Power Cost

[advanced design] + [manufacturing skill] = lowered power consumption and reduced prime-mover cost

A glance at the illustration will readily convince you of the plus features of these quality "custom-built" units. Spiral-Bevel and Helical Gearing assures quiet operation at high speeds, and increased tooth strength. Pinion shafts are integral with gears and finished to close tolerances by grinding. Ball or Roller Bearings support shafts and are designed to take combined radial and thrust loads. Housings are quality grey cast iron with all points of stress properly ribbed to reduce deflections and stresses to minimum; also housing design provides adequate oil reservoir and large radiating surface for thermal capacity. Vertical Units are also available, and are equipped with "dry well", which keeps oil from leaking at low speed shaft.

Hundreds of Philadelphia Spiral-Bevel Helical Units are used throughout Industry, driving Paper Mill Machinery, Conveyors, Blowers, Fans, Machine Tools.

Philadelphia Spiral-Bevel Reducers may be had in Horizontal or Vertical Types; Single, Double or Triple Reduction types, to meet every possible requirement.

Send for complete Catalog #SB-57, which describes all types of Horizontal and Vertical Spiral-Bevel Helical Units.

phillie gear®

PHILADELPHIA GEAR WORKS, INC.

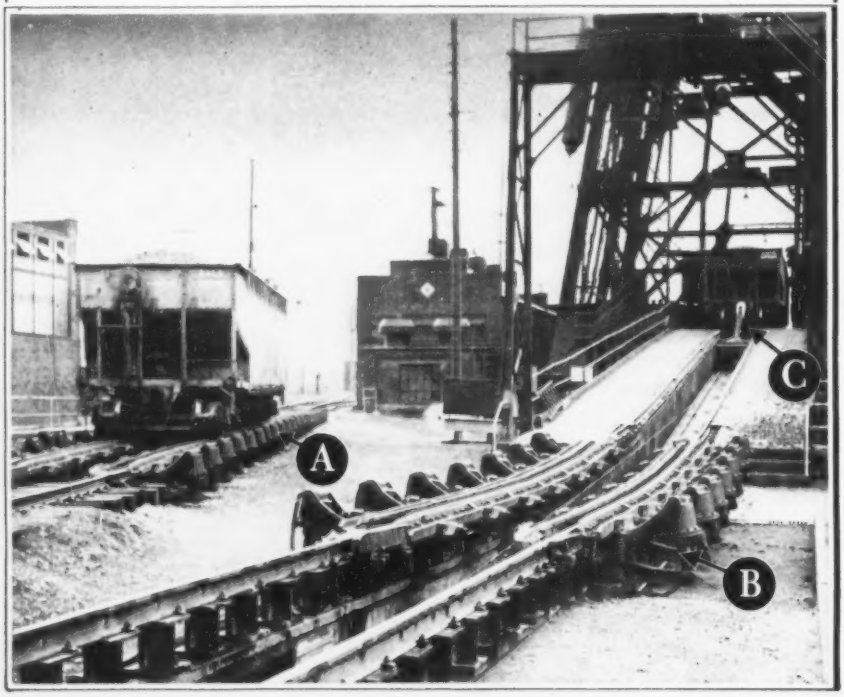
ERIE AVE. & G STREET, PHILADELPHIA 34, PENNA.

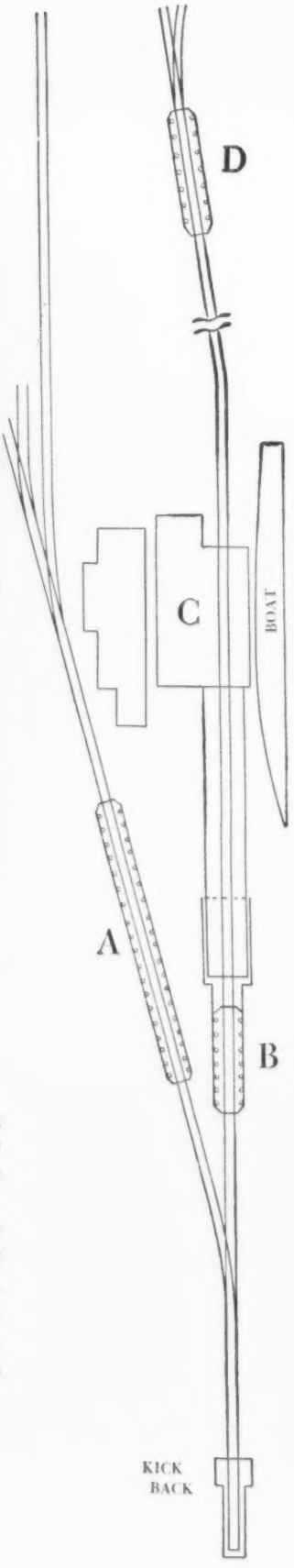
Offices in all Principal Cities

INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID MIXERS • FLEXIBLE COUPLINGS

Virginia Gear & Machine Corp. • Lynchburg, Va.

FAST AND EFFICIENT MATERIALS HANDLING—Loaded coal car rolls down the incline on the left at about 15 miles per hour. Its speed is reduced automatically in car retarder (A) so that it rolls up a "kick back" at just the right speed to send it back to retarder (B) where it is stopped automatically. A "barney" then pushes the car up the slope to the car dumper (C) where coal is unloaded directly into the ship. The next full car pushes the empty car off the dumper. It rolls down through retarder (D) to the proper track. All this is done by push-button control.





Automation with UNION CAR RETARDERS cuts costs on coal-loading dock

Forty carloads of coal an hour can be loaded on shipboard with this coal-handling system at a Lake Erie coal dock at Conneaut, Ohio.

This job formerly required a crew of men riding the cars and working the hand brakes—a hazardous occupation. Insurance rates were high and frequently men had to wait for the next ship to be loaded.

Now the work is handled quickly and safely by a push-button system using UNION Electro-Pneumatic Car Retarders. Costs have been greatly reduced and hazards eliminated.

If you have a materials-handling situation involving many carloads of coal, ore or other products, let us show you what can be done with automatic car-retarder systems to increase efficiency and reduce costs. Write for complete information.

UNION SWITCH & SIGNAL
DIVISION OF WESTINGHOUSE AIR BRAKE COMPANY
SWISSVALE, PENNSYLVANIA

NEW YORK ..... PITTSBURGH ..... CHICAGO ..... SAN FRANCISCO

AGF has "twins"

PROVEN DESIGN — The completely new AGF "Twin-Hearth" Shaker Furnace incorporates the proven and accepted design and construction features of standard AGF Shaker Hearths manufactured since 1921.

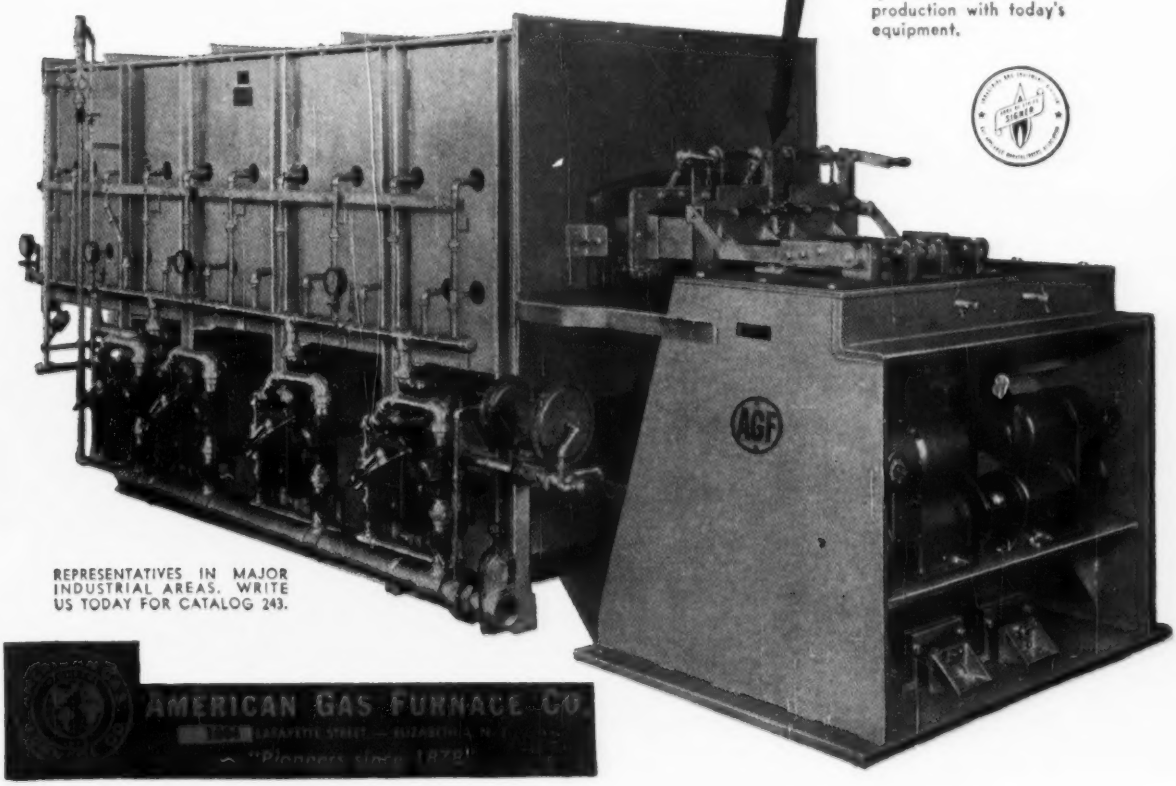
THE DIFFERENCE IS IN THE "TWIN-HEARTHS" — (each has an individually controlled drive) which permits heat treating *two different types of parts* requiring the same atmosphere and temperature, but which may require different or identical processing time cycles.

THE RADIANT MUFFLE TUBE within which the work is processed is externally heated. Many small burners accurately and uniformly heat the muffle — top, bottom and both sides. The burners are manifolded into multiple control sections for exact automatic control of the temperature of the various heating zones.

AUTOMATIC OPERATION ASSURES QUALITY CONTROL — Continuously automatic work flow coupled with exact control of processing temperature and atmosphere conditions assure that each piece receives the same identical treatment as every other piece, thus enabling a degree of scientific quality control that is unobtainable with batch type furnaces.

VERSATILITY
AGF Shaker Hearth Furnaces equipped with automatic quenching, washing and tempering systems are "Modern Production Tools" that can be incorporated into your manufacturing sequence.

"TWIN-HEARTH" Shakers are only one of the many AGF "PROVEN DESIGN" furnaces that provide you with the complete flexibility required to do tomorrow's production with today's equipment.

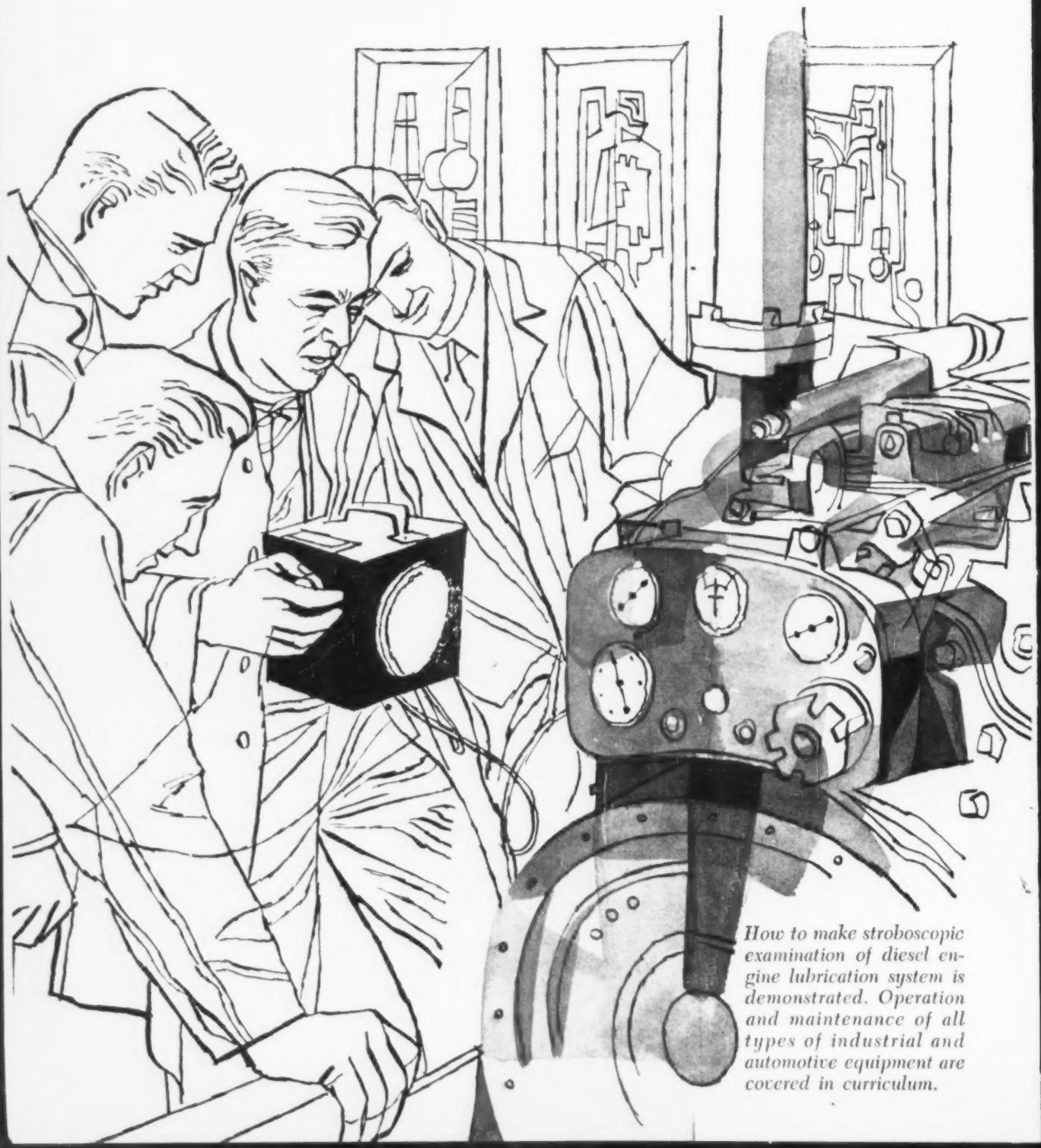


REPRESENTATIVES IN MAJOR INDUSTRIAL AREAS. WRITE US TODAY FOR CATALOG 243.

AMERICAN GAS FURNACE CO.
"Pioneers since 1878"

How does an oil company
prepare men for
industrial technical service work?

Here's how Standard Oil



How to make stroboscopic examination of diesel engine lubrication system is demonstrated. Operation and maintenance of all types of industrial and automotive equipment are covered in curriculum.

trains its men

At the Standard Oil training center on Chicago's south side—not far from the Company's refinery and research laboratory at Whiting, Indiana—men who have demonstrated an aptitude for such work are given a 17 week course in industrial lubrication, equipment maintenance and metal working. And thus begins the training Standard Oil gives its men who are to provide technical service to customers.

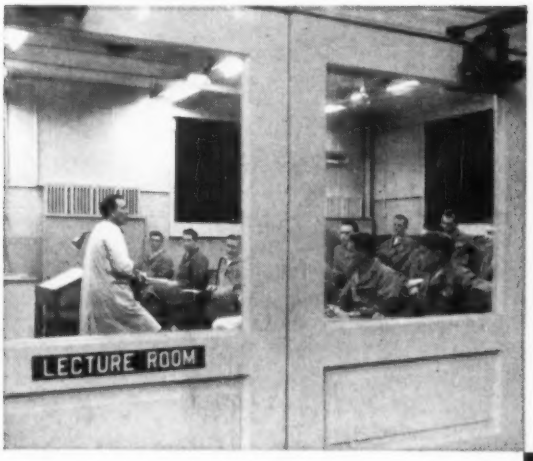
Most men selected for this Sales Engineering School have college degrees in some engineering or scientific field. And in most cases these men, prior to attending the school, have had field experience in technical service work to start them off with an appreciation of the problems industry meets in lubricating equipment and working with metal.

This course for lubrication specialists and engineers includes lectures and work in chemical laboratory, engine laboratory and machine shop. Senior Standard Oil men, recognized authorities on lubrication and metal working, are the instructors. Other Standard Oilers with teaching skills and years of field experience, direct the shop work and supervise the school's laboratories.

Class, shop and lab work are augmented by field trips to plants where "students" learn first-hand more about the lubrication problems confronting industrial customers.

The Standard Oil Sales Engineering School has graduated 15 of these classes. The many men who have completed the course are now serving customers out of Standard's 23 offices in fifteen Midwest and Rocky Mountain states. Would you like one of these men to call on you? Then telephone your nearby Standard Oil office. Or write Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.

Lectures, shop and lab work comprise training course.



STANDARD

STANDARD OIL COMPANY
(Indiana)

Testing and comparing bearing lubrication methods.

Kinematic viscosimeter is used to test viscosity of lube oil. C. S. Brown (right) learns to run test. Brown, like many classmates, has science degree.

Got a deep drawing problem?

Perhaps you need dies with the wear resistance of **CRUCIBLE'S HYCC TOOL STEEL.** Ask your Crucible warehouse staff—they have **HYCC** in stock.

Crucible HYCC is an air or oil hardening tool steel with high resistance to wear. That's why both heat treaters and production men prefer this high chromium, high carbon tool steel for deep drawing steel dies as well as for blanking dies and punches for long production runs. It's also suitable for high production forming operations.

Crucible HYCC is one of dozens of tool steel grades stocked at the Crucible warehouse near you. This plant is Crucible-owned and -operated . . . to give you all the advantages of direct "mill" service with your steel selection and fabrication problems. Crucible is the only specialty steel producer *fully integrated to the point of use*. That means control and responsibility from raw material to warehouse delivery to you.

STOCKS MAINTAINED OF:

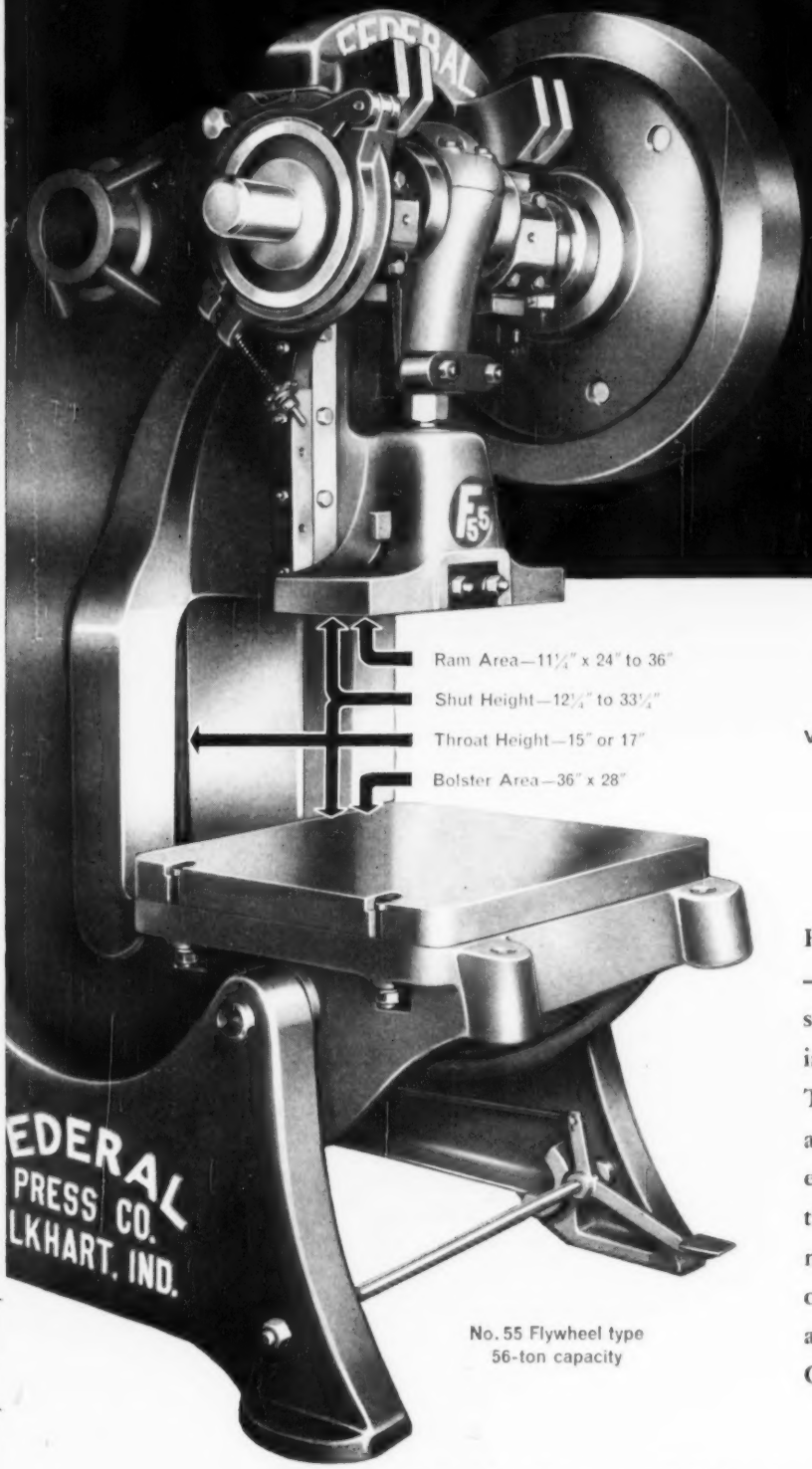
Rex High Speed Steel . . . ALL grades of Tool Steel (including Die Casting Die and Plastic Mold Steel, Drill Rod, Tool Bits, and Hollow Tool Steel Bars) . . . Stainless Steel (Sheets, Bars, Wire, Billets, Electrodes) . . . Max-el, Hy-Tuf, AISI Alloy . . . Onyx Spring, Hollow Drill Steel and other special purpose steels.

CRUCIBLE WAREHOUSE SERVICE

Crucible Steel Company of America

General Sales Offices, The Oliver Building, Mellon Square, Pittsburgh 22, Pa. Branch Offices and Warehouses: Atlanta • Baltimore Boston • Buffalo • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Dayton • Denver • Detroit • Grand Rapids Harrison • Houston • Indianapolis • Los Angeles • Milwaukee • New Haven • New York • Philadelphia • Pittsburgh • Portland, Ore. Providence • Rockford • San Francisco • Seattle • Springfield, Mass. • St. Louis • St. Paul • Syracuse • Toronto, Ont.

Introducing the new FEDERAL "55" for



JOBS... BIG and BULKY

Ram Area—11¼" x 24" to 36"
Shut Height—12¼" to 33¼"
Throat Height—15" or 17"
Bolster Area—36" x 28"

No. 55 Flywheel type
56-ton capacity

Featuring oversize dimensions, the Federal "55" handles work formerly confined to larger, more costly equipment

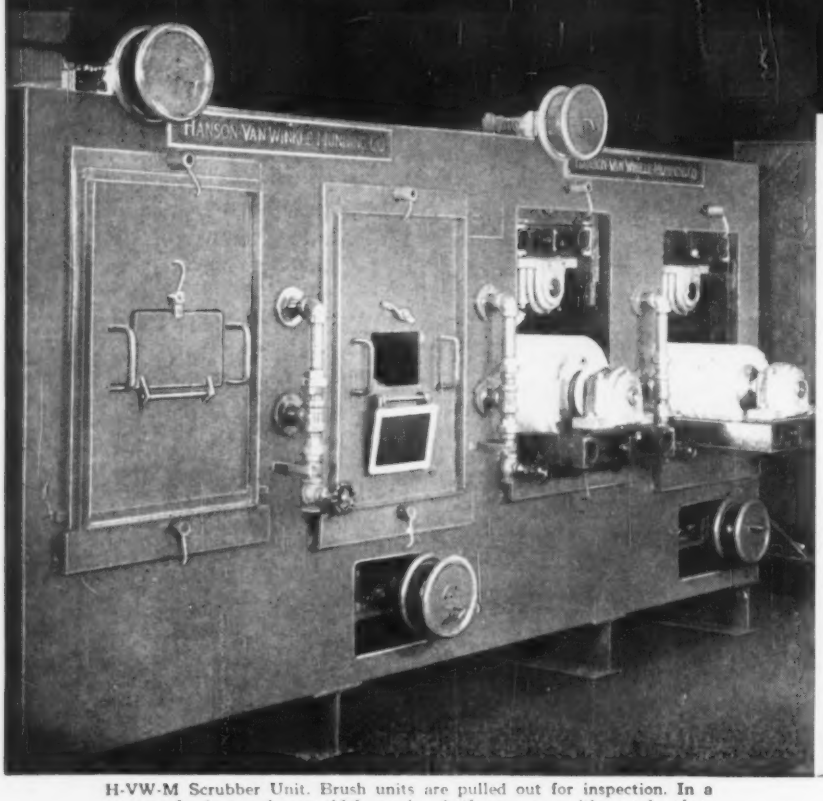
Here is a press born to handle bulky jobs—laminations, die-cast trimming, progressive die work and the like. Check its important dimensions and you'll see why. This rugged, precision-built FEDERAL is a great press for other reasons, too. It embodies the many *extra quality* features that have made FEDERAL PRESSES famous the world over. Available in geared or flywheel models, with mechanical or air clutch. WRITE NOW FOR NEW CATALOG showing complete line.

Federal Press Company, 702 Division Street, Elkhart, Indiana

FEDERAL *Open back Inclinable* PRESSES

32 Years of Quality Construction

CONTINUOUS STRIP AND SHEET METAL PROCESSORS



cut cleaning time to a fraction with this automatic H-VW-M SCRUBBER UNIT

H-VW-M Scrubber Unit. Brush units are pulled out for inspection. In a matter of minutes they could be replaced, if necessary with new brushes.

...and no down time either! Brushes are replaced easily while unit is in operation!

H-VW-M Scrubber Units—which adapt to fit into any system—are equipped with an exclusive, patented device that permits replacement of brushes *while the unit is running*. Just turn a few bolts, slide worn brush out, and insert replacement. Not a moment's production time is lost!

Add the advantages of this remarkable new feature to the enormous savings you'll realize in cleaning, reworking and inspection time, and you'll see why the rugged, efficient H-VW-M Scrubber Unit has no equal. 3149

Get more facts about H-VW-M Scrubbers, with their exclusive easy-brush-replacement feature, by writing today for Bulletin HB-100.

Hanson-Van Winkle-Munning Co., Matawan, New Jersey. Offices in principal cities.

H-VW-M

Hanson-Van Winkle-Munning Company, Matawan, New Jersey. Offices in principal cities.

PLATEMANSHIP —Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

call KE for plant expansion or new facilities

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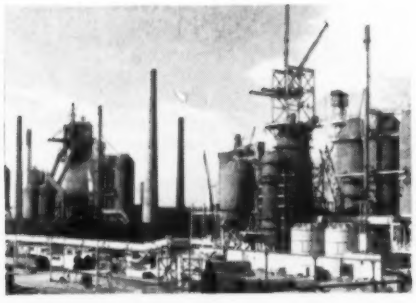
call KE for plant expansion or new facilities

call KE for plant expansion or new facilities

I N G E N U I T Y

has made KE a major engineer-contractor serving Steel



At India's mammoth Tata works, at Jones & Laughlin, at Kaiser Steel—Kaiser Engineers' ingenuity advances the art of making steel.

KE can take your development thoughts from a gleam in your eye through start-up. KE performs any part—economic analysis, plant location, engineering, design, procurement, expediting, construction. One contract can cover all.

For your next plant or expansion, take advantage of KE's cost-saving ingenuity and wide experience in Steel.

KAISER ENGINEERS engineers-contractors
Contracting since 1914

Kaiser Engineers Division of Henry J. Kaiser Company • Oakland 12, California • New York, Pittsburgh, Washington, D.C., Buenos Aires, Calcutta, Dusseldorf, Montreal, Sydney, Tokyo

4364

Loef Co. "From-Scale-to-Bale" Efficiency features 7-hour, 95,000 lb. production of Dempster-Balester!

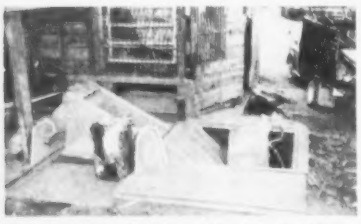
1. Load of scrap is weighed-in . . .

2. . . . by Mr. R. L. Blumberg.

3. Crane takes scrap from truck . . .

4. . . . to Dempster-Balester's Skip Pan.

5. Auxiliary-Compression Door CRUSHES . . .



6. . . . preceding charge into charging box.

7. Charging Box Door closes; scrap is baled.

8. Then bale is ejected—a 1-2-3 operation. 1. Skip Pan LOADS Charging Box. 2. Auxiliary-Compression Door CRUSHES scrap metal deep into box. Charging Box Door closes and charge is baled while Skip Pan is re-loaded. 3. Then, bale is EJECTED and Skip Pan dumps another load into charging box — a fast, continuous and efficient baling cycle that permits you to produce compact, high density bales, one-after-another!

Note how Dempster-Balester operator moves Skip-Pan Loader up to dump next charge into box and simultaneously moves Auxiliary-Compression Door down to CRUSH the scrap when it is dumped into box.

Note above that with usually one stroke the scrap is CRUSHED into charging box, ready for baling.

Business men in Athens, Ga., call The Loef Company's scrap metal collection operation a "from-scale-to-bale" production plant. It's a tribute to the efficient operation at The Loef Co., headed by Harry Loef.

Turning salvable scrap metal into segregated re-usable products calls for engineering. And hundreds of scrap metal engineers like Harry Loef and son-in-law R. L. Blumberg weigh-in scrap secured by regular collectors . . . then, minutes later, compress the loads into compact bales by efficient, fast Dempster - Balester presses!

MR. HARRY LOEF

For eight years The Loef Co. used a Dempster - Balester Model "275". This, their first press, produced on the average of 90,000 lbs. of baled scrap in 14 hours. When the operation expanded and a faster press was required, the "like new and still efficient" Model "275" was sold and Mr. Loef purchased the faster Dempster-Balester Model "700". The "700" increased production to an average of 95,000 lbs. of baled scrap in 7 hours! However, although not in an industrial area, a 109,000 lb. carload of lamination was recently purchased for a test-run through the press The Dempster-Balester accomplished the task in 1 hour and 33 minutes. "That just gives you an idea what this Dempster-Balester can do," reported Foreman J. J. Escoe, who added: "Too, of course, much of the credit belongs to Henry Knight, our crane operator, and Mark Garing, press operator. They're good!"

Big advantages of the Dempster-Balesters, according to Mr. Loef, are minimum investment, minimum installation expense and high operating efficiency. "We just don't have any maintenance to speak of," added Mr. Escoe. "But, we clean and grease our Dempster-Balester regularly. Might add that a man couldn't ask for any better parts service. Dempster Brothers sure take care of their presses."

High tribute to us. We appreciate it. We are proud of the accomplishments of our Dempster-Balesters, and of our service staff. We believe you, too, will find your wisest and most profitable press investment will be in a Dempster-Balester! Write us today for complete information. *Manufactured by Dempster Brothers, Inc.*

DEMPSTER BALESTER®

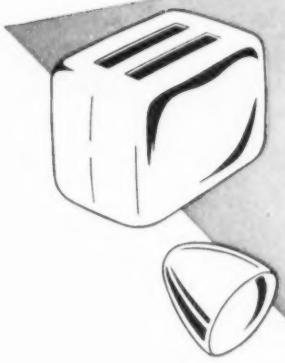
DEMPSTER BROTHERS, 497 N. Knox, Knoxville 17, Tennessee

J&L

RESTRICTED SPECIFICATION
COLD ROLLED STRIP STEEL

Serves Typical Low Carbon End Use Requirements Such as these . . .

SIZE	8 x .045
ANALYSIS	1010
FINISH	#2 finish
HARDNESS	Non-Scalloping quality
THICKNESS TOLERANCE	± .0005 Incl. crown
WIDTH TOLERANCE	± .005
COIL SIZE	250# per inch of width
PACKAGING	Skidded



SIZE	12 x .032
ANALYSIS	1010
FINISH	#3 finish
HARDNESS	#4 Temper
THICKNESS TOLERANCE	± .0005 Incl. crown
WIDTH TOLERANCE	± .005
COIL SIZE	up to 200# per inch of width
PACKAGING	Paper interleaved—skidded and shrouded

SIZE	4 x .065
ANALYSIS	1010
FINISH	#2 finish
HARDNESS	#3 Temper
THICKNESS TOLERANCE	± .0005 Incl. crown
WIDTH TOLERANCE	± .005
COIL SIZE	Cut lengths
PACKAGING	Skidded

Many times, by varying processing methods, J&L is able to develop properties in cold rolled strip steel which greatly facilitate production operations and/or give the product superior qualities without adding to end product cost. End result is lower costs through improved products or better assembly and improved yield. We believe you will find it worthwhile to investigate the possibilities of J&L Restricted Specification Cold Rolled Strip Steel applied to your production.

THE 4 IN 1 SOURCE FOR YOUR COLD ROLLED STRIP STEEL

Now there are four J&L plants with facilities for production of "Restricted Specification" cold rolled strip. Strategic locations at Youngstown, Indianapolis, Los Angeles and Kenilworth, N. J., provide the security of 4 sources of supply plus the close working relationship which these local production centers make possible.

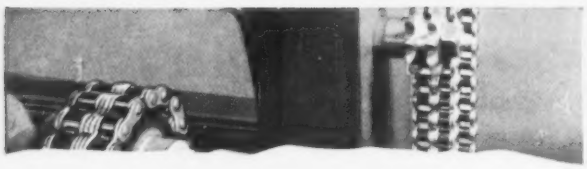
J & L Strip Steel Division Products

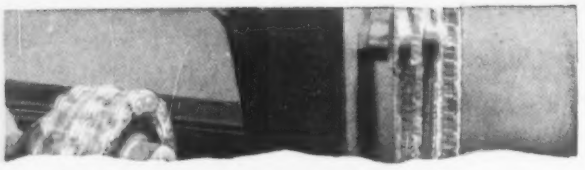
Low Carbon, High Carbon Annealed or Hardened and Tempered Spring Steel, Electro Galvanized or Hot Dipped Continuous Galvanized, Tin Coated, Alloy, Stainless.

J&L STEEL

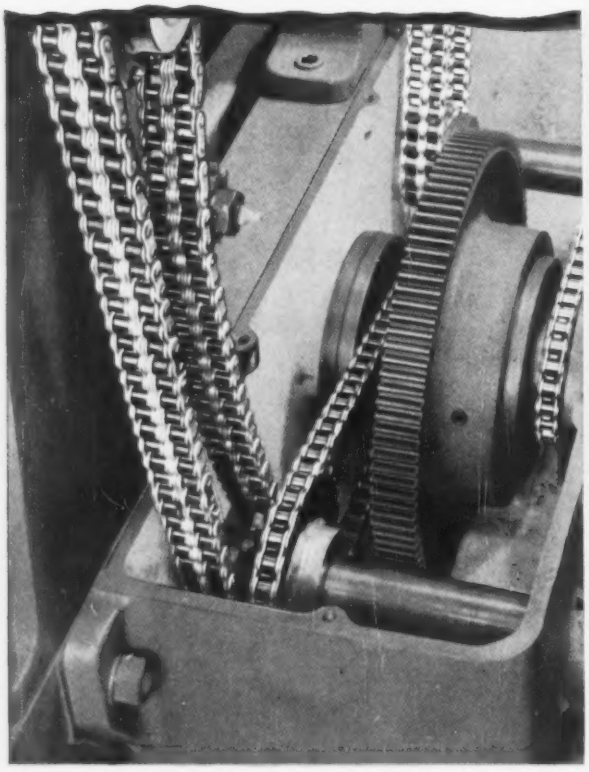
Jones & Laughlin
STEEL CORPORATION
STRIP STEEL DIVISION
GENERAL OFFICES: YOUNGSTOWN 1, OHIO

PLANTS: YOUNGSTOWN • INDIANAPOLIS • LOS ANGELES • KENILWORTH, NEW JERSEY
SALES OFFICES: New York • Rochester • Newington, Conn. • Youngstown • Cleveland
Detroit • Indianapolis • Chicago • Los Angeles • San Francisco
FORMERLY THE COLD METAL PRODUCTS COMPANY

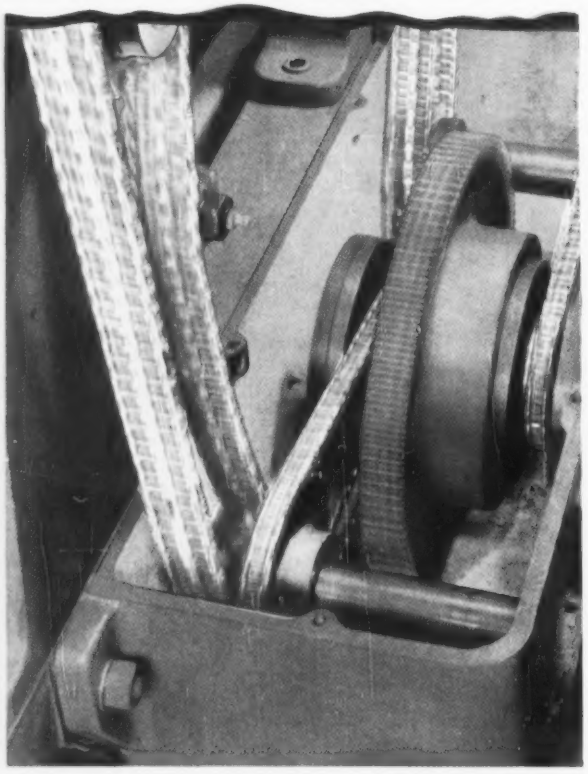




To static strength . . . add *dynamic strength*



RESISTANCE TO TENSILE STRESS is achieved with properly heat-treated, accurately machined side bars made of premium steel and fitted with properly hardened pins, bushings, rollers.



STRENGTH OF CHAIN IN MOTION results from such refinements as pitch-hole preparation, micro-finish of parts, special processing of side bars, pre-lubrication, rigid quality control.

Why LINK-BELT roller chain takes stresses in stride

On *tough-service* drives and conveyors, Link-Belt precision steel roller chain consistently delivers longer life. That's because its *greater dynamic strength* withstands the starting shock and centrifugal loads of severe operation.

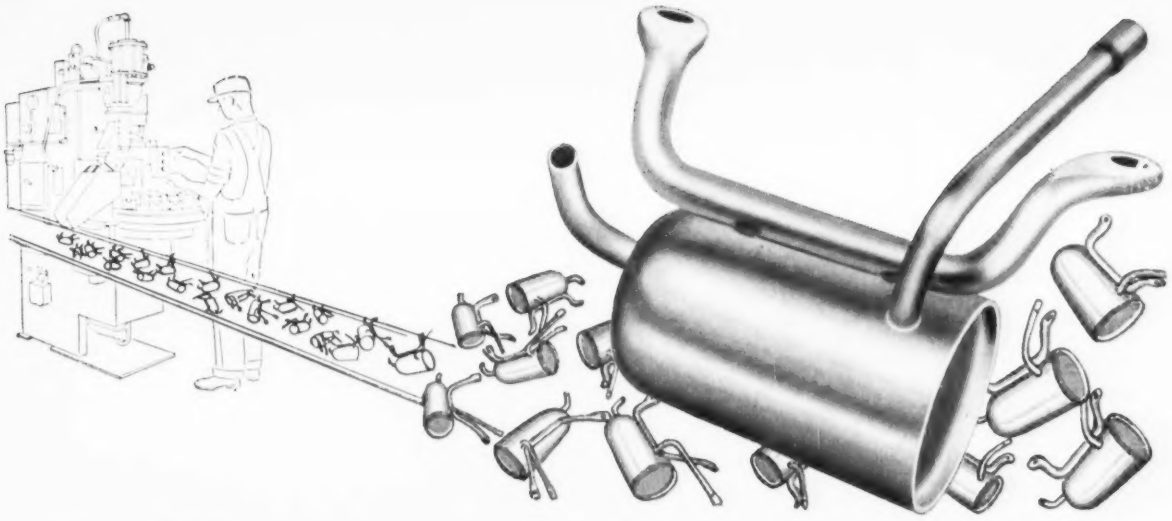
Reports from users prove the effectiveness of Link-Belt's manufacturing extras that add to greater dynamic strength. Shot-peened rollers give greater fatigue life and ability to withstand impact . . . lock-type bushings end a common cause of chain stiffness . . . pre-stressing provides uniform load distribution . . . closer heat-treat control insures uniformity.

For facts, see your nearby Link-Belt office or authorized stock-carrying distributor. 14,643

LINK-BELT

ROLLER CHAIN AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N. S. W.; South Africa, Springs. Representatives Throughout the World.



Muffler Assemblies at 1800/hr.
with T-W Resistance Welder

An appliance manufacturer welds mounting braces to refrigerator mufflers at a rate of 1800 assemblies per hour with this Taylor-Winfield dial feed resistance welder. It speeds production and cuts unit cost by continuous loading and multiple automatic operations.

The operator loads two sets of parts in one station of the dial table. They revolve through automatic stations where they are checked for proper position, resistance welded and ejected from the welder. The operator loads continuously while these operations take place.

T-W worked with product design engineers to solve the problem of welding solid round bar stock to a cylinder sealed at both ends. Two projections were pinched in the bar stock to achieve uniformly strong welds without an electrode in the muffler interior.

Taylor-Winfield has designed and built more dial feed welders than any other manufacturer. These and many other types of T-W welders can cut your assembly costs. For prompt attention to your weld production problems, contact the nearest T-W branch office.

The **TAYLOR·WINFIELD** *Corporation* Warren, Ohio

ELECTRIC RESISTANCE AND ARC WELDING MACHINES

Sales and Service

CHARLOTTE · CHATTANOOGA · CHICAGO · CLEVELAND · DALLAS · DAYTON · DENVER
DETROIT · LOS ANGELES · PHILADELPHIA · PORTLAND, OREGON · ST. LOUIS · STAMFORD
OAKVILLE AND WINDSOR, ONTARIO

big or small, Surface mechanized furnaces pay off

Whether your volume is modest or vast—with short runs or long—there are many ways to profit from Surface experience in mechanizing heat treat equipment for ferrous and nonferrous metals. All of them give you uniform duplication of results; upgraded labor; reduced unit costs; expanded capacity; and strengthened competitive position.

You may require a single batch type furnace, (right above) in which work is handled automatically from charge to discharge. For expanded facilities, a battery of such furnaces can be handled by one operator. Standard furnaces can also be linked in sequence to form an automatic heat treat line.

You might want your furnaces integrated directly with machines at separate points in your production line, (right center). This line processes bearing races from raw stock through a sequence of manufacturing operations—machining, heat treating, and finishing.

Your methods may call for a self-contained automatic heat treat line within your production line, (right below). Hoppers convert variable production from machining operations to the steady rate best for efficient heat treating. All operations are interlocked and continuous.

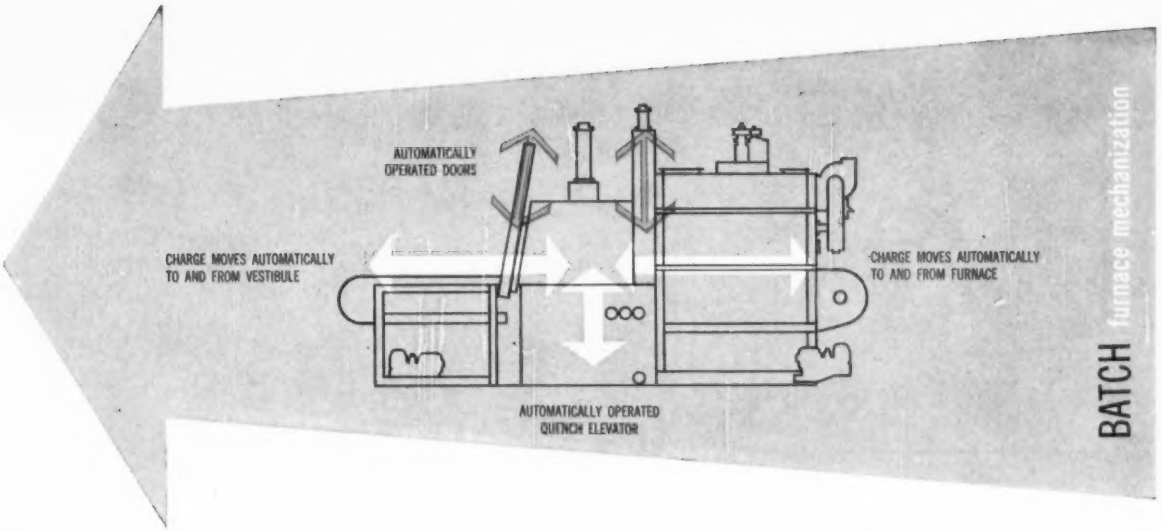
These are merely samples of the range and depth of mechanization know-how which Surface has accumulated since as far back as 1929. That was the date of installation of a completely automatic line for normalizing, hardening, and tempering transmission parts. Still operating, that line has paid for itself many times over.

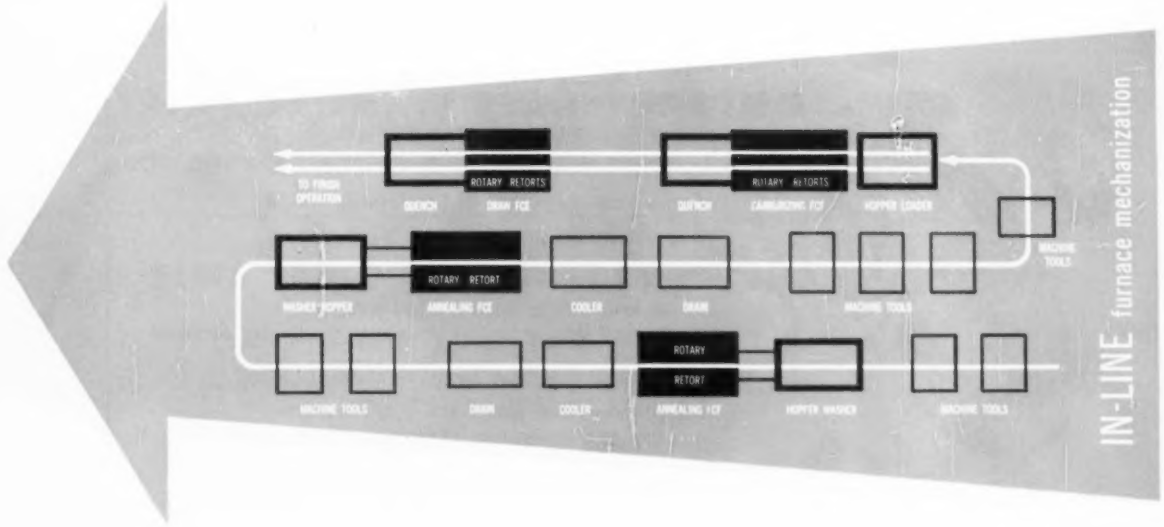
Explore these advantages for your own operation; write for Bulletin SC-176.

Surface Combustion Corporation, 2373 Dorr St., Toledo 1, Ohio. In Canada: Surface Industrial Furnaces, Ltd., Toronto, Ontario.

wherever heat is used in industry

Surface®


AUTOMATICALLY
OPERATED DOORS
CHARGE MOVES AUTOMATICALLY
TO AND FROM VESTIBULE
CHARGE MOVES AUTOMATICALLY
TO AND FROM FURNACE
AUTOMATICALLY OPERATED
QUENCH ELEVATOR
BATCH furnace mechanization


ROTARY RETORTS
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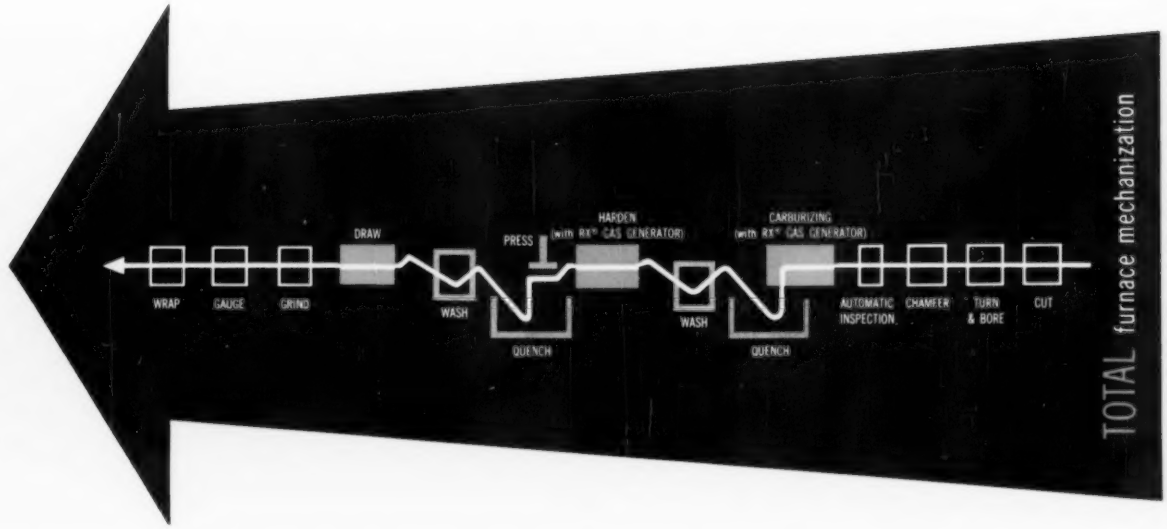
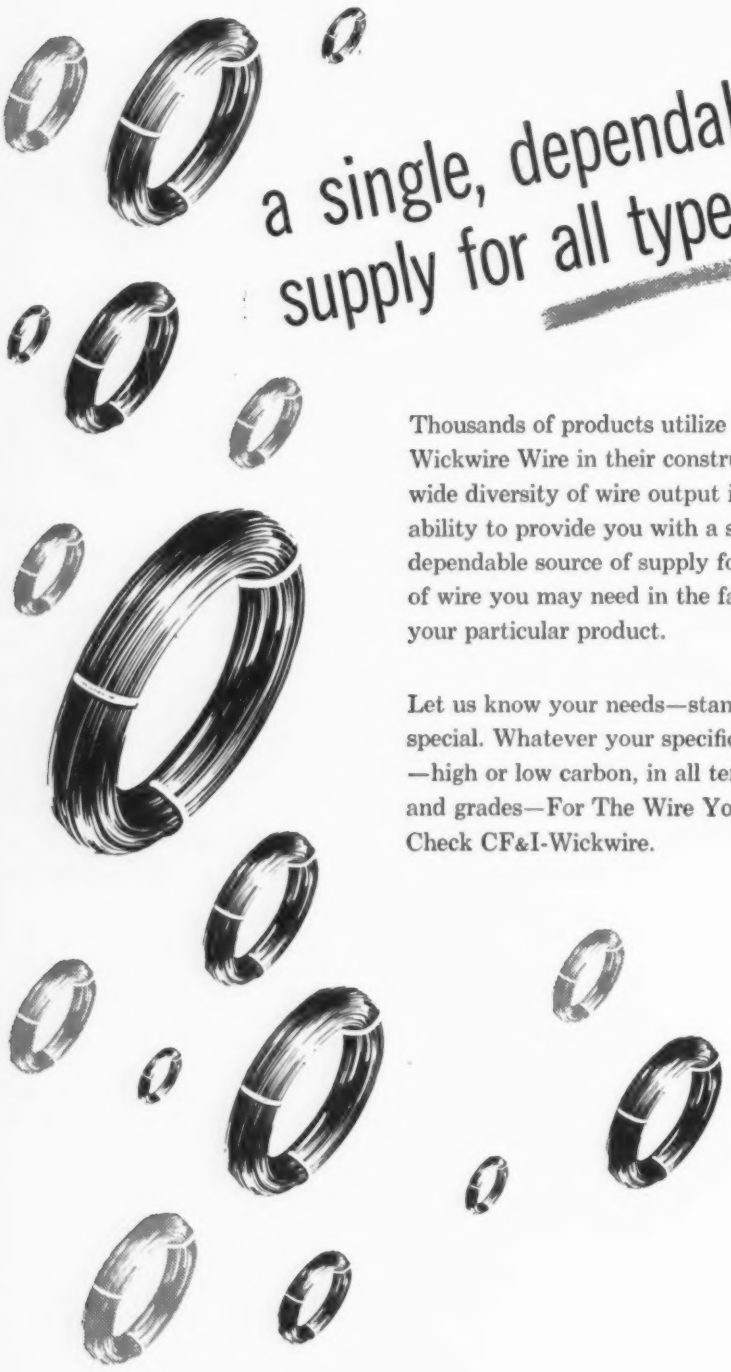
IN-LINE furnace mechanization


DRAW
PRESS
HARDEN
(with RX* GAS GENERATOR)
CARBURIZING
(with RX* GAS GENERATOR)
WRAP
GAUGE
GRIND
WASH
QUENCH
WASH
QUENCH
AUTOMATIC
INSPECTION
CHAMFER
TURN
& BORE
CUT
TOTAL furnace mechanization

CF&I-WICKWIRE

a single, dependable source of supply for all types of steel wire



Thousands of products utilize CF&I-Wickwire Wire in their construction. This wide diversity of wire output is proof of our ability to provide you with a single, dependable source of supply for every type of wire you may need in the fabrication of your particular product.

Let us know your needs—standard or special. Whatever your specifications may be—high or low carbon, in all tempers, finishes and grades—For The Wire You Require—Check CF&I-Wickwire.

has the wire you require

✓ **UPHOLSTERY SPRING WIRE . . .**

for bedding, furniture, automobile seats and back cushions.

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always uniform . . . in tensile strength and high fatigue life.

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for mechanical springs . . . all types and designs.

✓ **FINE AND SPECIALTY WIRE**

available in many grades, tempers and finishes to fit your requirements.

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where fabrication calls for severe forming.

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for hundreds of wire-forming applications.

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CF&I

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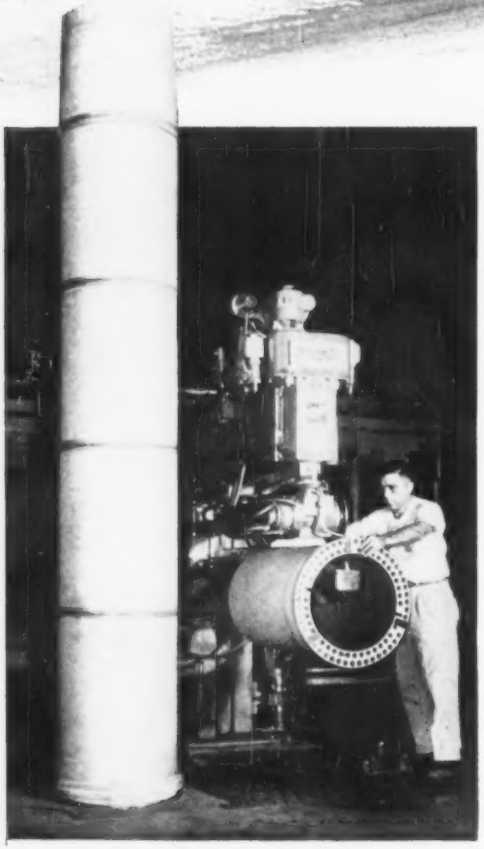
HEAT • WEAR • CORROSION

HAYNES Alloys solve the

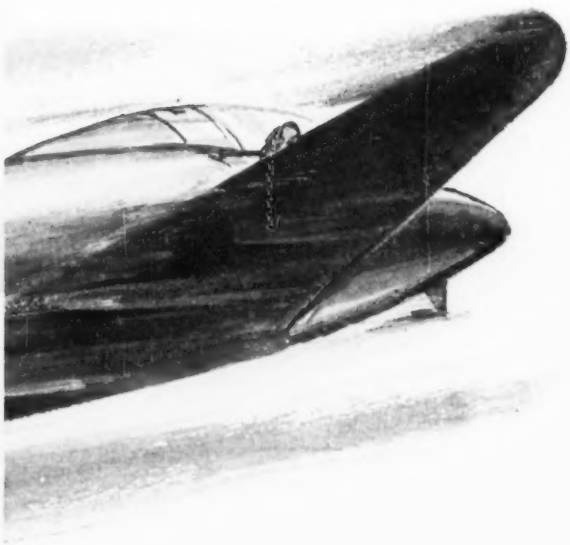


HEAT

2,000 degree jet blast!

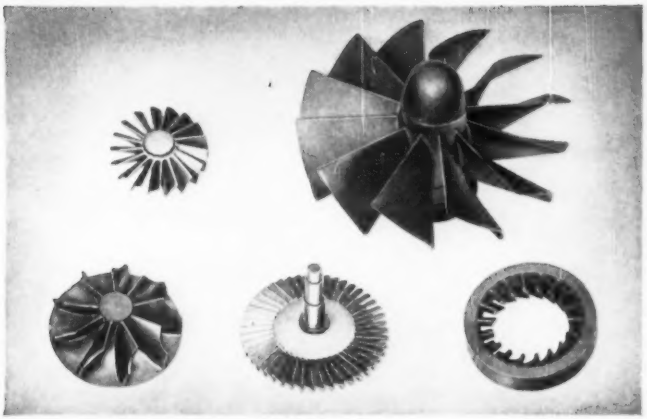
The jet engine tailpipe of the Navy's A4D "Skyhawk" operates at extremely high temperatures. That is just one of the many reasons why this part is made of MULTIMET alloy. This is one of 6 HAYNES wrought alloys that have unusual resistance to high temperatures and oxidation. Because of their exceptional properties, HAYNES alloys are being used extensively in such parts as after-burner components, jet engine tailpipes, turbine blades, and nozzle vanes.

tough problems



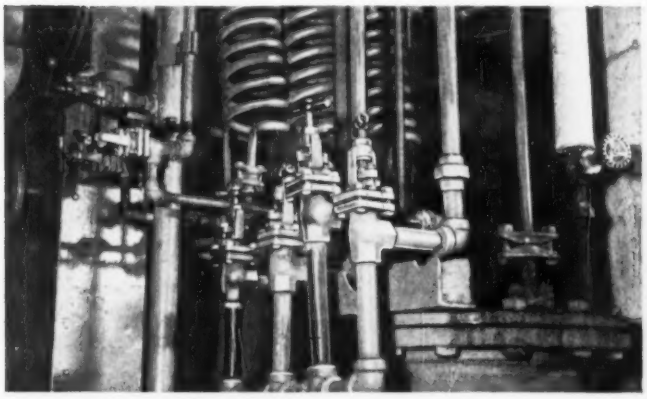
If you have an application that is creating a tough heat, wear, or corrosion-resistance problem, you will find it profitable to check with HAYNES Stellite Company. In practically every industry, you will find HAYNES Alloys doing a better job, lasting longer, reducing maintenance and proving most economical.

Tell us your problem and we will send you descriptive literature on the HAYNES Alloy best suited to solve it. Write HAYNES STELLITE COMPANY, Division of Union Carbide Corporation, General Offices and Works, Kokomo, Indiana.



PRODUCTION Intricate turbine wheels mass-produced.

HAYNES' investment-casting method offers a selection of alloys developed for economical operation over a wide temperature range. Blades and wheels are produced as one integral part to as-cast tolerances that permit operation with unusually fine clearances at high speeds.



CORROSION Withstands corrosive chlorine 10 years!

Handling highly corrosive liquid chlorine was an expensive maintenance problem—until valves made of HASTELLOY alloy C were installed. This is just one of the many corrosive difficulties met by HAYNES Alloys. They also have excellent resistance to hot mineral acids, strongly oxidizing salts, and powerful gaseous oxidants over a wide range of temperatures and concentrations.

HAYNES ALLOYS

HAYNES STELLITE COMPANY

Division of Union Carbide Corporation

UNION CARBIDE

"Haynes," "Multimet," "Hastelloy" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

Serving Tidewater's DELAWARE REFINERY NINE **JEFFREY** WATER SCREENS

Delaware River intake to Tidewater Oil Company's refinery near Delaware City, Delaware, is served by this line of Jeffrey traveling water screens.

Three sets of Jeffrey screens—each screen served by a 34,375 gpm pump—remove floating debris and suspended matter from saline water drawn into the refinery. They are rated at two feet-per-second velocity through clean wire mesh at maximum flow and at minimum water depth.

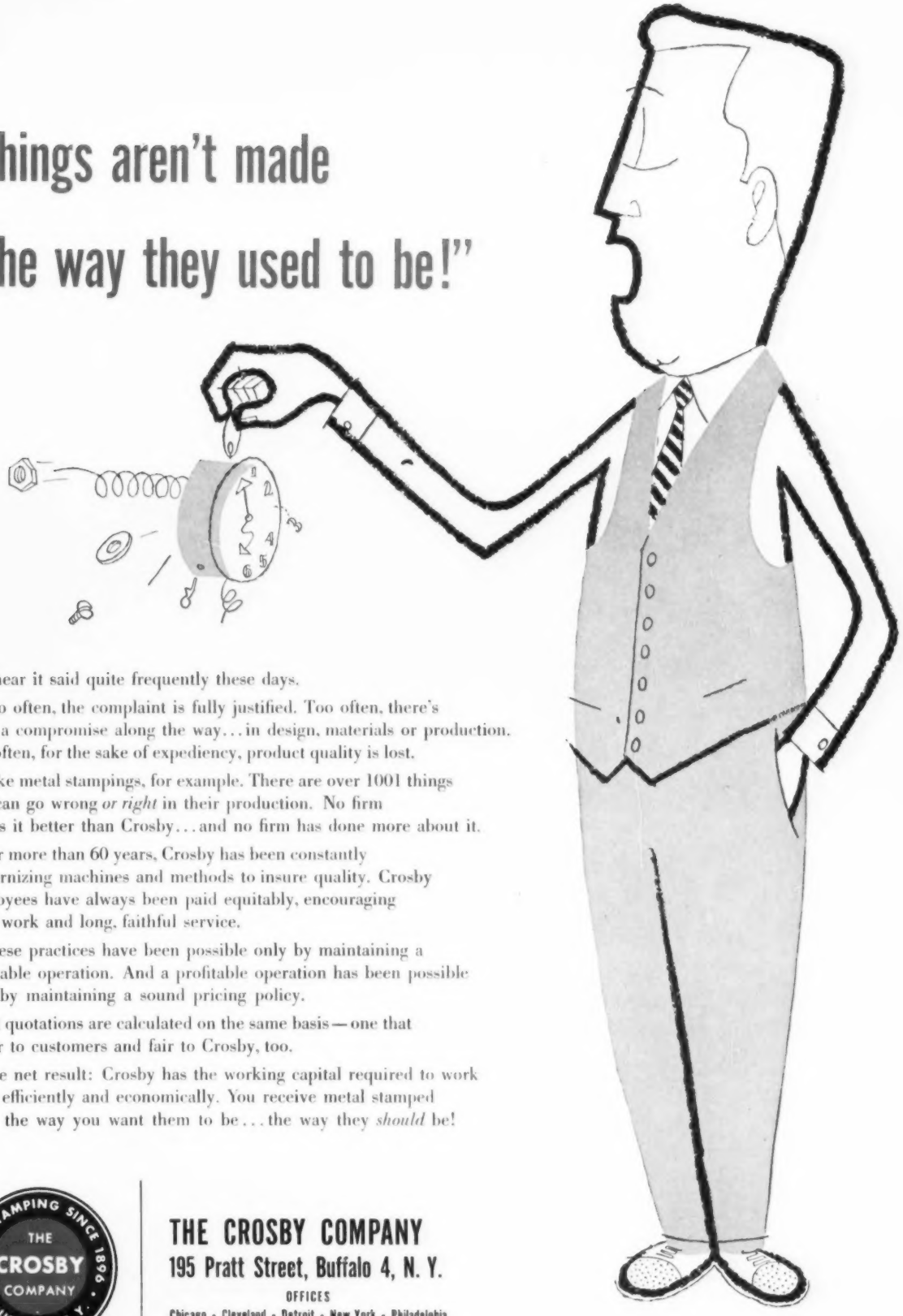
Controls are manual or automatic. Automatic controls can be set for any differential head loss of from 0" to 24" and working at ten to twelve feet in tide variation. Jeffrey sanitation engineers worked with C. F. Braun & Co., Engineers, in planning the installation.

Equipment for preparing and reclaiming water for industrial uses is available from Jeffrey. Our engineers have many years' experience in planning and designing systems for power plant cooling water, pulp and paper process water. Catalog 905 describes this equipment. The Jeffrey Manufacturing Company, 925 North Fourth Street, Columbus 16, Ohio.

CONVEYING • PROCESSING • MINING EQUIPMENT . . . TRANSMISSION MACHINERY . . . CONTRACT MANUFACTURING

JEFFREY

"things aren't made the way they used to be!"



You hear it said quite frequently these days.

Too often, the complaint is fully justified. Too often, there's been a compromise along the way... in design, materials or production. Too often, for the sake of expediency, product quality is lost.

Take metal stampings, for example. There are over 1001 things that can go wrong *or right* in their production. No firm knows it better than Crosby... and no firm has done more about it.

For more than 60 years, Crosby has been constantly modernizing machines and methods to insure quality. Crosby employees have always been paid equitably, encouraging good work and long, faithful service.

These practices have been possible only by maintaining a profitable operation. And a profitable operation has been possible only by maintaining a sound pricing policy.

All quotations are calculated on the same basis — one that is fair to customers and fair to Crosby, too.

The net result: Crosby has the working capital required to work most efficiently and economically. You receive metal stamped parts the way you want them to be... the way they *should* be!

METAL STAMPING SINCE 1896 · THE CROSBY COMPANY · BUFFALO, N.Y.

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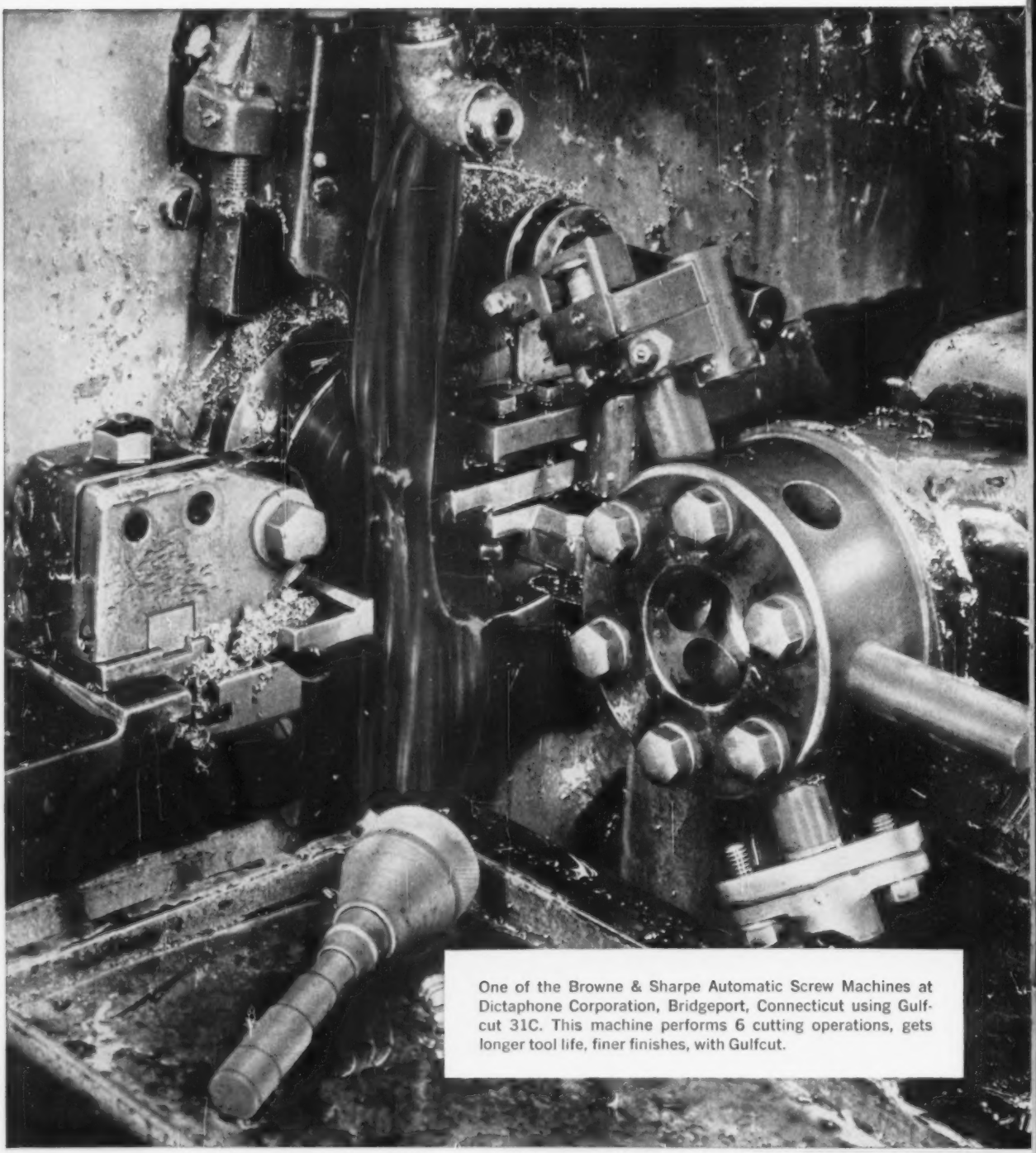
At Dictaphone Corporation, Bridgeport, Connecticut...

Closer tolerances, better



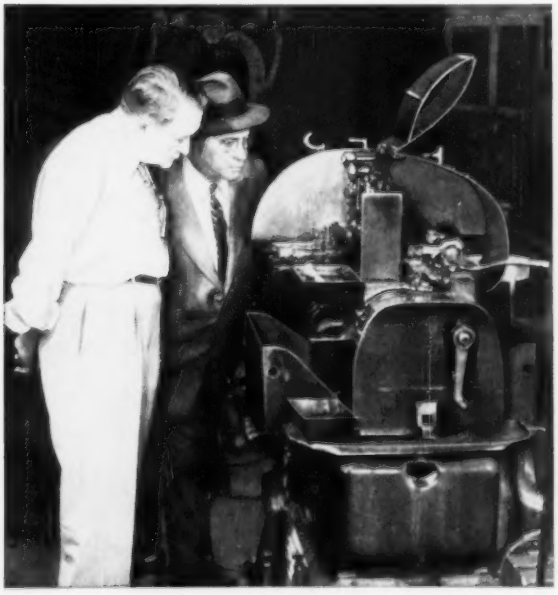
One of the Browne & Sharpe Automatic Screw Machines at Dictaphone Corporation, Bridgeport, Connecticut using Gulfcut 31C. This machine performs 6 cutting operations, gets longer tool life, finer finishes, with Gulfcut.

finishes, fewer rejects ...with GULFCUT!

Dictaphone has used Gulfcut 31C since Gulf first introduced this cutting oil—has used it exclusively for the past 10 years. On brass, bronze, aluminum, or any of the several types of steel used in manufacturing precision parts for Dictaphone Machines . . . *one* cutting oil, Gulfcut, does the job!

Says Joseph A. Maloney, Process Engineer: "Day in, day out, our machines are producing fine quality work, using Gulfcut. We get steady production at an even rate—hold tolerances as close as 3 ten thousandths. Gulfcut 31C provides the necessary combination of lubrication and cooling that leads to longer tool life, better finishes, with fewer rejects."

Whether you need a mineral-lard oil, a sulfurized-mineral oil, a sulfurized-mineral-lard oil, a sulfo-chlorinated-lard oil, or an emulsifying oil (the Gulfcut line includes all of these) . . . call your Gulf Sales Engineer. He will be glad to recommend the proper cutting oils for *your specific needs.*



Joseph A. Maloney, Process Engineer at Dictaphone, and J. A. Magill, Gulf Sales Engineer, observing Gulfcut 31C at work on precision parts. Gulfcut cutting oils excel over a wide range of cutting applications . . . help to reduce machining costs.

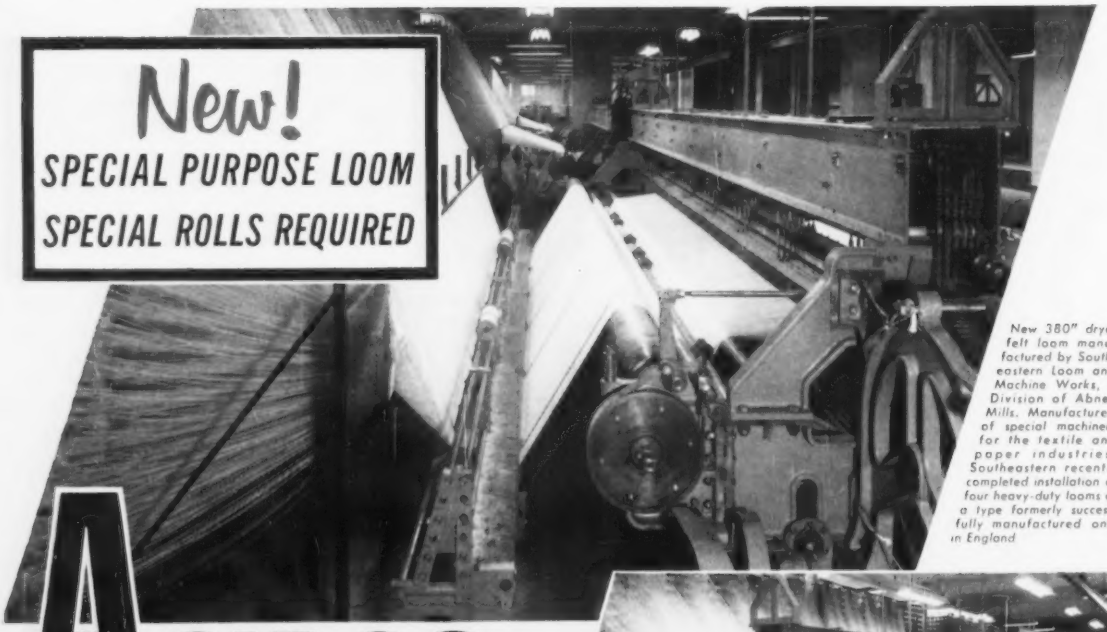
GULF OIL CORPORATION

1822 Gulf Building, Pittsburgh 30, Pa.

GULF

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

New!
SPECIAL PURPOSE LOOM
SPECIAL ROLLS REQUIRED



New 380" dryer felt loom manufactured by Southeastern Loom and Machine Works, a Division of Abney Mills. Manufacturers of special machinery for the textile and paper industries, Southeastern recently completed installation of four heavy-duty looms of a type formerly successfully manufactured only in England

ACIPCO

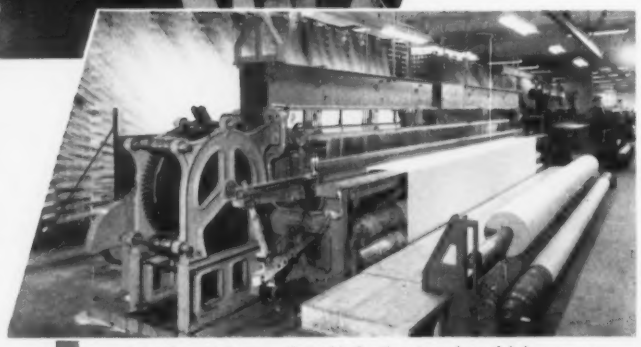
Centrifugally Spun STEEL TUBES

Rolls in this 380" Southeastern loom, designed for weaving thick dryer felts for the paper industry, must stand extremely heavy loading. Minimum roll deflection and run-out are vital to successful operation.

The long length necessary—33'6"—imposed a requirement for unusual dynamic balance and dimensional stability in these rolls.

Southeastern Loom and Machine Works, a Division of Abney Mills, selected ACIPCO centrifugally spun steel tubes for the let-off and take-up rolls in this new loom. Because ACIPCO's centrifugal process produces tubes with *inherent* dynamic balance and dimensional stability, and because they can be produced in the longer lengths now being specified by modern equipment manufacturers, the selection was right from the start.

When function and design set up unusual or difficult requirements for the tubular steel or alloy iron parts in your application, call on ACIPCO. You'll get a combination of expert technical assistance, manufacturing competence and high quality centrifugally spun tubing that produces successful results.



Let-off and take-up rolls in this Southeastern dryer felt loom were fabricated from ACIPCO centrifugally spun tubing. Large rolls are 33'6" long, with 10½" OD and 2½" wall thickness.

VERSATILE ACIPCO CENTRIFUGALLY SPUN STEEL TUBES

are used in the manufacture of calender, engraving, press, slitter, rewinder, plate cylinder, squeeze and starch bath rolls, as well as in hundreds of other industrial applications.

SIZE RANGE: Lengths up to 410" to meet modern machinery requirements have been produced. OD's from 2.25" to 50"; wall thicknesses from .25" to 4".

ANALYSES: All alloy grades in steel and cast iron, including heat and corrosion resistant stainless steel; plain carbon grades and special non-standard analyses.

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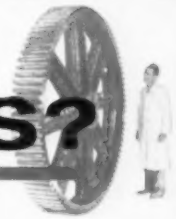
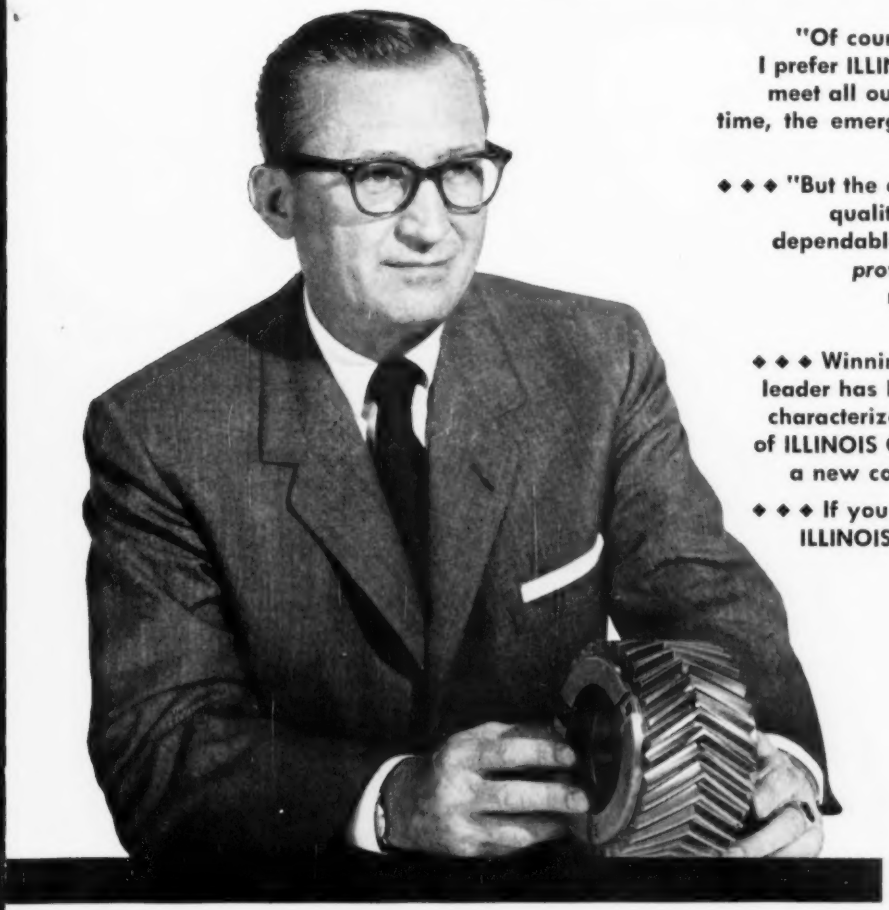
WHY BUY ILLINOIS GEARS?



THE ANSWER IS QUALITY... EVERYTIME!

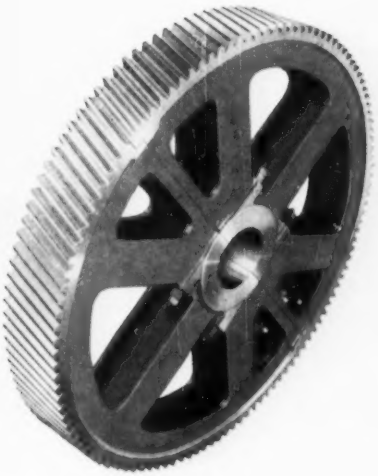


"Of course, there are many reasons why I prefer ILLINOIS GEARS. I like the way they meet all our specs, the way they deliver on time, the emergency service we get when we need it—to mention a few.

◆ ◆ ◆ "But the one thing I like most of all is the quality of ILLINOIS GEARS—enduring, dependable quality I can trust because it is *proven by performance* . . . one more reason why we feel they are our most economical buy."

◆ ◆ ◆ Winning this recognition as the quality leader has been rightfully earned because it characterizes every step in the manufacture of ILLINOIS GEARS—a creed that established a new concept of quality in gear making.

◆ ◆ ◆ If you are not now using or specifying ILLINOIS GEARS find out about the gears that are *made right with quality as the first consideration.*



Look for this mark ILL® *the symbol on finer gears*

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IMPROVE PRODUCT PERFORMANCE

CORROSION-RESISTANCE, PLUS EXCELLENT PAINT HOLDING SURFACE, are two of the outstanding features of Republic Terne Plate. Moreover, the terne metal coating won't crack, flake or peel even under severe forming operations. Terne Plate is ideal for oil filter and condenser cans as shown above, as well as for gas tanks, mufflers, radiators, air filters, vacuum tanks, TV chassis and many other applications.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

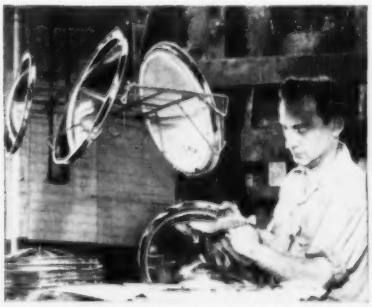
and PRODUCTION with low-cost, Republic Terne Plate

Republic Long Ternes provide a unique combination of advantages to help boost product performance and simplify production, with maximum economy. Reason is Republic's uniform, tight coating of terne metal—a combination of lead and tin—available on all types of coiled sheets in widths up to 36".

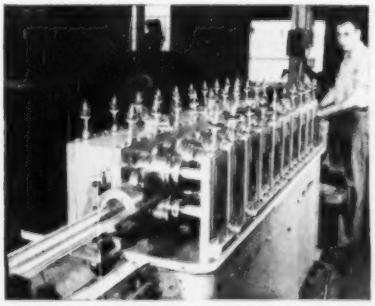
In addition to its high corrosion-resistance, Republic Terne Plate provides an excellent paint-holding surface requiring no preliminary preparation. The coating itself is applied by the continuous hot dip method to assure uniform thickness and a tight bond with the base steel. As a result, Republic Terne Plate can be subjected to severe forming operations without damage to the coating. Further, the terne metal coating acts as a lubricant, helping to extend die life and, in some cases, permitting a reduction in the number of drawing operations required to produce a given product.

Republic Terne Plate can also be furnished in cut lengths to suit user requirements. Prices are comparable to galvanized steel. However, economies in production and finishing tend to offset or eliminate any added cost in the finished product.

It will pay you to get the full story on Republic Terne Plate, one of the most versatile of all mass production fabricating materials. Simply contact your local Republic representative, or mail coupon for information.



HEAVY-DUTY PERFORMANCE PLUS LIFE TIME BEAUTY are assured in products like these automobile wheel covers, when they are fabricated of Republic ENDURO® Stainless Steel. There is no applied surface to crack, chip, peel or wear away. ENDURO provides excellent resistance to corrosion, heat, abrasion and denting. Send coupon for facts.



PRODUCTION AND APPLICATION PROBLEMS WERE SOLVED when the Kelley Manufacturing Company, Houston, Texas, standardized on Republic Electro Paintlok® for fabrication of acoustical fastening members. The chemically treated zinc surface of Electro Paintlok provides corrosion-resistance and paint holding properties. Coating is unharmed by the most severe forming. For data, send coupon.

LOWEST COST CORROSION PROTECTION for fabricated sheet products is secured through use of Republic Continuous Galvanized. A good example is the beverage cooler liner box shown being fabricated. Republic Continuous Galvanized is sheared, blanked, pierced, formed, flanged, soldered, beaded, and Pittsburgh Lock Seamed. Its tight zinc coating remains unaffected. Send for details.

STEEL

and Steel Products

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Please send me more information on:

☐ Manufacturers Terne Plate ☐ Electro Paintlok
☐ ENDURO Stainless Steel ☐ Continuous Galvanized

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HIGH SPEED PRODUCTION WITH RELIANCE V★S DRIVES

Six Reliance V★S Drives make it possible to operate this complete line as if it were a single machine.

Carloads of pipe are pouring out of the new Edmonton, Alberta plant of Alberta Phoenix Tube & Pipe, Ltd. This $6.5 million installation is producing pipe at unprecedented rates.

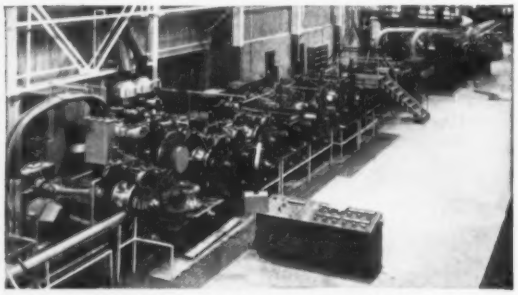
Volume pipe production requires something special in a drive system—one that furnishes precise speed control and instantaneous motor response. A wide stepless range of speeds is provided to handle various pipe diameters and lengths, and all sections of the line operate at the same relative speed.

A team of Reliance Application Engineers, working with the machinery builder, built this specialized drive. This team knows the processes of the steel industry and how to handle the problems involved. Engineering knowledge, backed by the quality of Reliance products, supplied this accurate, simple-to-operate, economical drive.

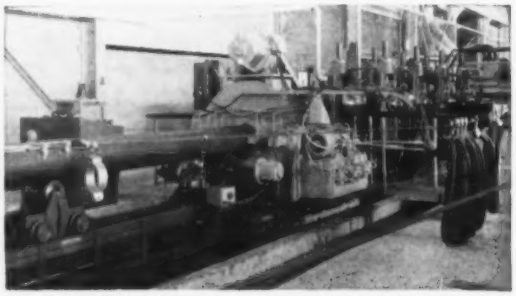
The Reliance Application Engineering Department builds drives for every industry. A team of engineers who are experts on your industry's operation, stand ready to engineer and build the drive for your particular needs.

If you would like more information on this installation, write for Bulletin L-2505.

L-1841



The welding section operator controls the speed of the entire line from this Reliance Pendent Station.



The Reliance V★S Drive on this flying cutoff automatically measures the pipe and controls the movement and speed of the carriage.

RELIANCE ELECTRIC AND ENGINEERING CO.

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Many specific betterments are inherent in Scovill-pioneered production techniques, such as CONTINUOUS CASTING. Others result from the very broad scope of Scovill facilities . . . among the largest and most modern in the industry. Still others stem from important advances in precision control of alloy composition, temper and grain size, physical dimensions and finish.

When you use brass and aluminum in your shop bearing the unusual Scovill brand identification, you can be sure of its uniformly superior quality . . . lot after lot . . . order after order . . . made better to . . .

bring out the BEST in your fabricated products

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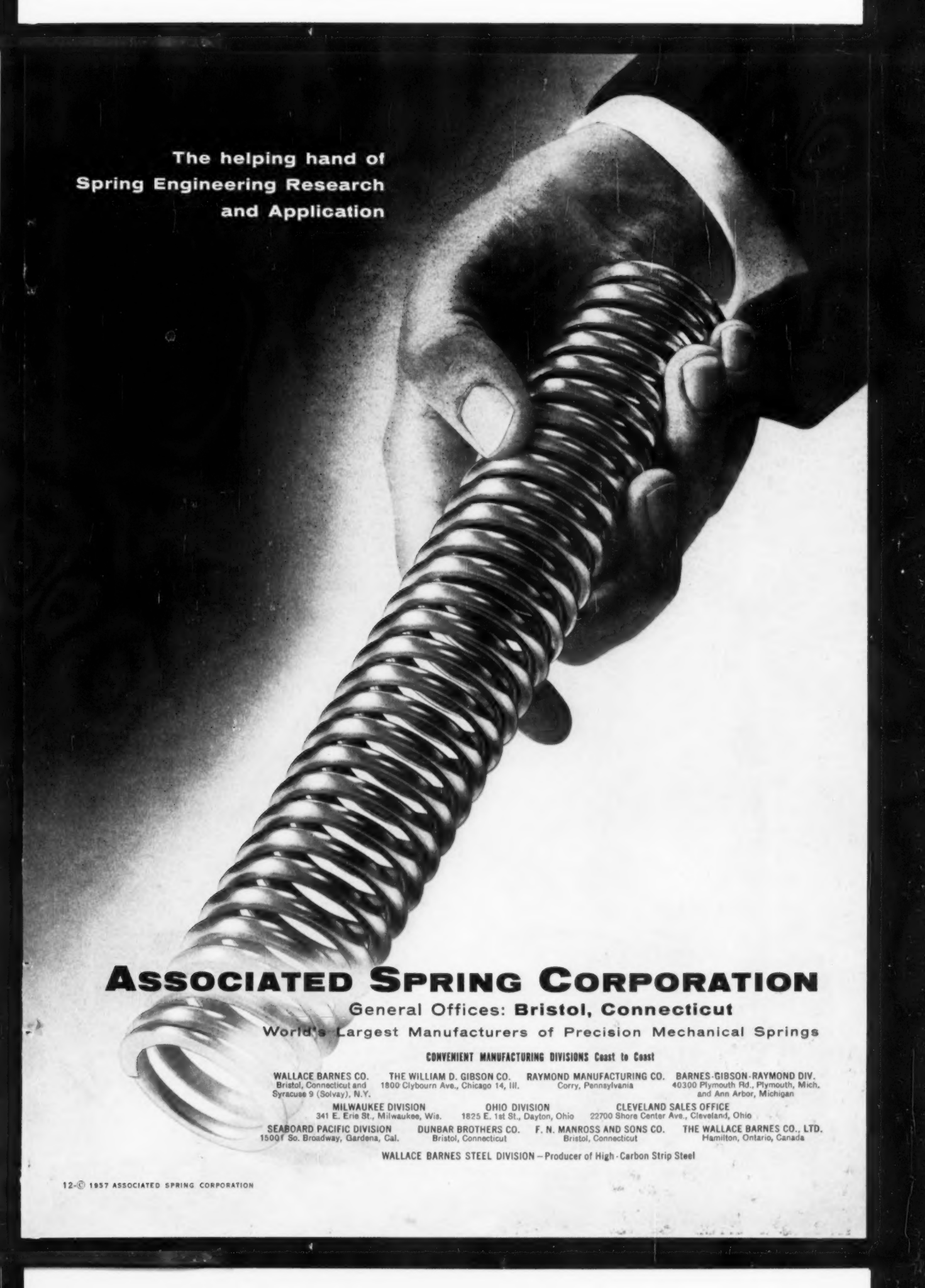
8SC57



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WALLACE BARNES STEEL DIVISION – Producer of High-Carbon Strip Steel

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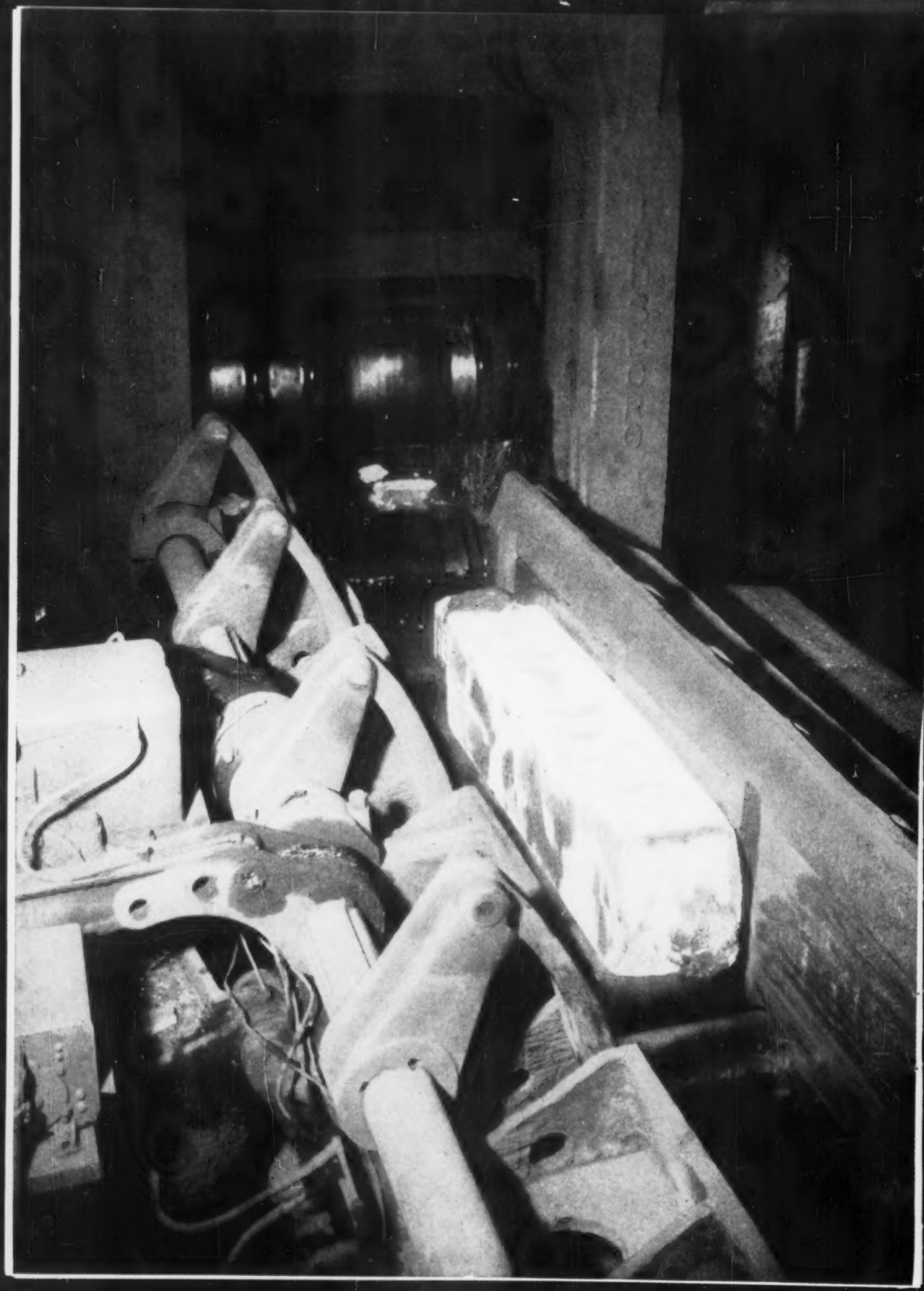


Modern Steelmaking

Big Ingot Reduction Contributes to Superior Quality Stainless Steel at J & L

The quality of stainless steel is assured at the J & L Stainless Steel Division because the large capacity furnaces permit the pouring of larger ingots. For example: When an ingot is cast, its structure is coarse and its grains are exceptionally large. To develop greater strength, it must be "hot worked" into blooms or billets; and because of the larger ingot size, J & L is able to roll ingots to blooms or billets with more reduction than is the normal practice in most mills. The result is sound, pipe-free centers, finer grain and more uniform structure.

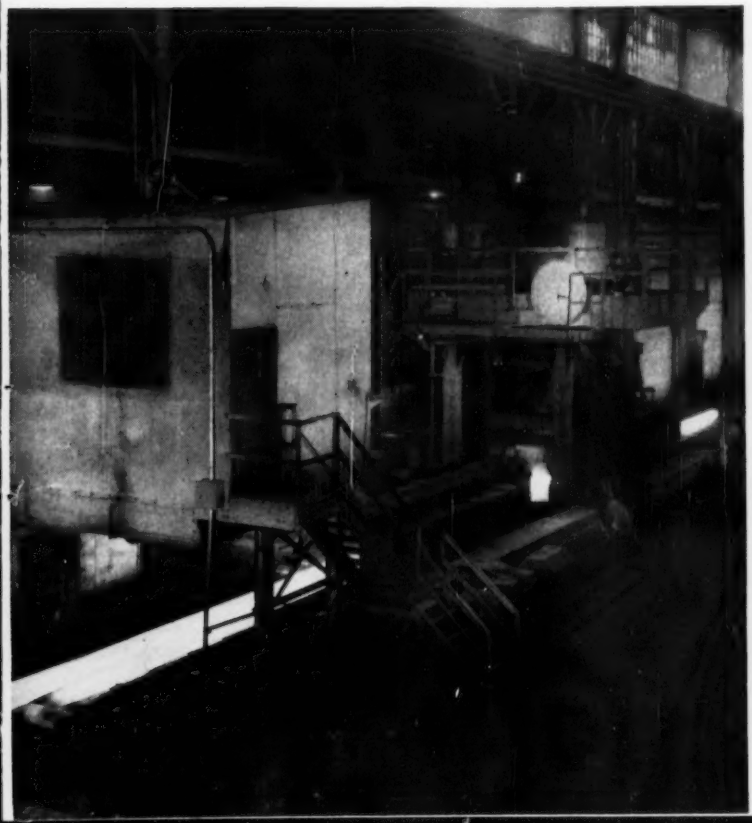
This is just one more factor—one more facility—contributing to the continuing effort at the Stainless Steel Division of J & L, to bring to its customers the highest quality stainless steel available.

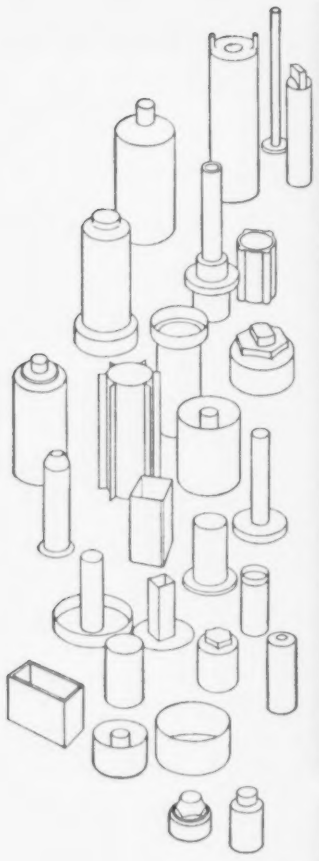
Ready-to-ship Inventory Adds a *Plus* to Quality

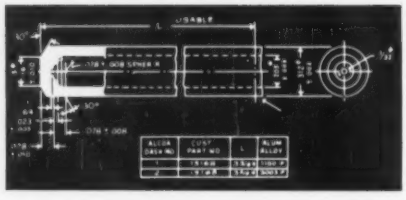
Quality, plus the ability to ship a wide range of stock *immediately*, is an unbeatable combination. A stock of hundreds of tons of finished stainless bars is now available from our storage facilities. Write for our latest stock lists, or for quotations on finished bars or billets.

JL STEEL

Jones & Laughlin
STEEL CORPORATION
STAINLESS STEEL DIVISION
Box 4606 • Detroit 24, Michigan
FORMERLY ROTARY ELECTRIC STEEL CO.







small part, big saving–thanks to an **ALCOA IMPACT**

This interesting little Alcoa® Impact does a big job in a thermostat control designed for use with electrically heated appliances. It is the probe which forms the sensing element of the thermostat. Changes in the length of the probe control the opening and closing of the unit's electrical contacts.

Considering the close tolerances and extreme length-to-diameter ratio of 15 to 1, most designers would visualize this part as a screw machine product. Fabricated on a screw machine, it would call for a drastic deep-drilling operation into solid bar stock, plus a further chamfering and cutoff operation on the closed end. In short, it would be a fairly expensive and troublesome part to produce.

As an Alcoa Impact, however, just one punch of the press delivers a complete, close-tolerance part in a fraction of a second. The only finishing operation required is the cutting of the piece to the exact length required. The production economies are easy to see. And remember, just about any closed-end tubular part or cup-shaped part can be produced by impact extrusion. No matter how intricate, if it can be made as an Alcoa Impact, it is fabricated in one smack in a split second.

If you think you should be considering the possibility of using an Alcoa Impact, send for our helpful design manual, *Alcoa Impacts—Metal in Motion*. If you have a problem you want to talk about right now, call your nearest Alcoa sales office, (you'll find it listed under "Aluminum" in the Yellow Pages of your telephone directory) and an Alcoa sales engineer will be glad to help you out. Aluminum Company of America, 1997-J Alcoa Building, Pittsburgh 19, Pa.

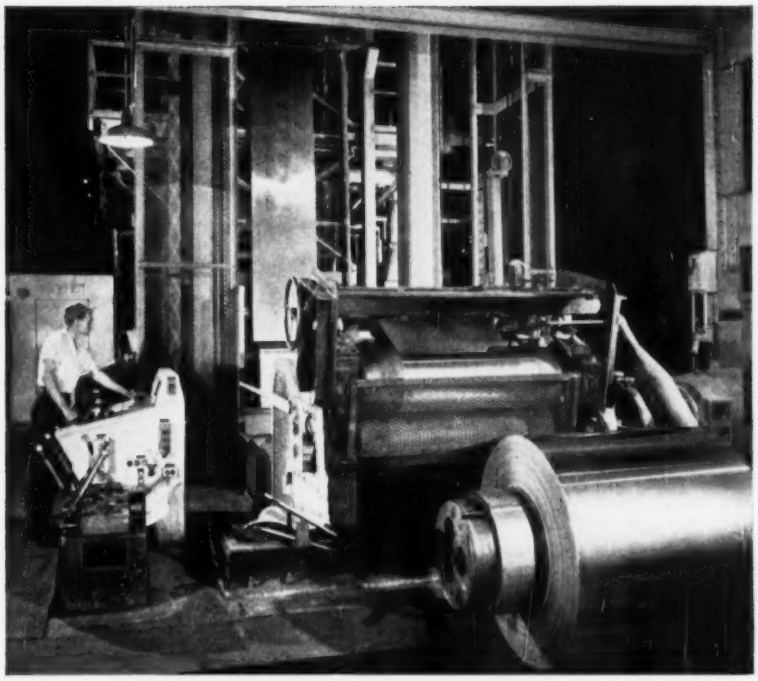
Some Impact Rules of Thumb—
Check your problems against this list:

1. Parts requiring hollow sections—either tube or cup-shaped with one end closed.
2. Parts with walls or surfaces requiring zero draft.
3. Parts requiring lengths up to eight or ten times the diameter.
4. Parts requiring the strength of forgings.
5. Parts requiring tolerances down to ±0.005".
6. Parts requiring ribs, bosses or fins as integral parts.
7. Parts requiring low unit cost in mass production. (Often the savings in machining, fabrication and assembly made by impacts amortize tooling in relatively short runs.)

ALCOA ALUMINUM IMPACTS

YOUR GUIDE TO THE BEST IN ALUMINUM VALUE

THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS



Tin plate continuously bright-annealed in direct gas-fired vertical one-pass Selas furnace.

26 Single-Pass Selas Furnaces Heat-Process Strip Continuously . . . at Production Speeds

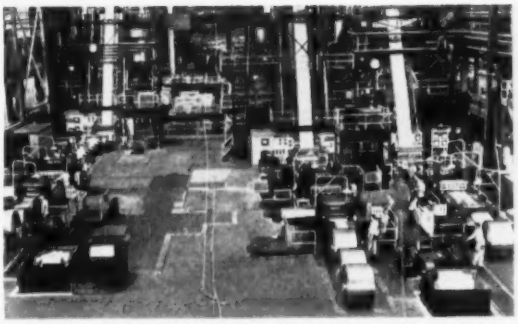
Selas combines Gradiation® Heating with process control to handle a variety of mill operations

Throughout the nation's metal-producing industry, Selas has pioneered, designed and constructed single-pass strip heat-processing lines for bright annealing of steel . . . annealing stainless steel . . . tin reflow . . . galvanizing-annealing . . . preheat for galvanizing . . . preheat for annealing . . . blueing . . . special coatings . . . brass annealing . . .

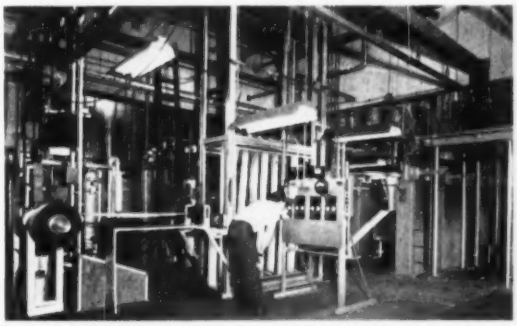
In all these operations, radiant gas heat, precisely applied across the strip width, increases heating speed and produces unsurpassed uniformity in product quality.

- Compact single-pass design saves valuable floor space . . . avoids rolls in heated section, eliminating accompanying maintenance and product quality difficulties.
- Elimination of externally-prepared atmosphere in heating section reduces operating costs.
- Precise thermal control assures reproducible uniformity, regardless of gauge variations.

Technical details of continuous annealing 60 tons per hour tin plate by Selas Gradiation will be discussed in a paper presented to The Combustion Session, Tuesday morning, September 24th, at the annual convention, Iron and Steel Engineers, Pittsburgh.



Annealing and galvanizing strip 48" wide is a high-speed, single-pass, continuous operation with Selas Gradiation heating.



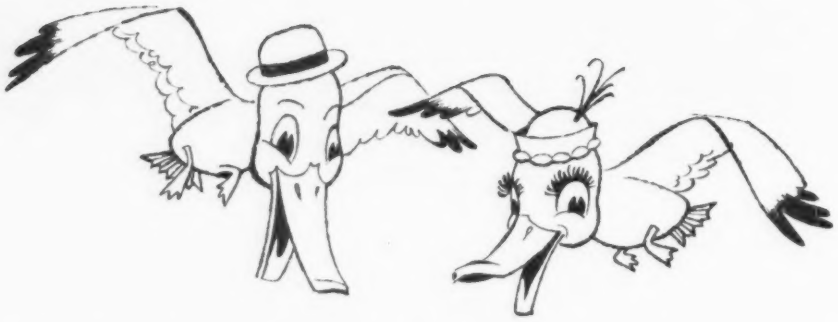
Control panel governs temperature, strip speed, gas combustion and atmosphere composition in this Selas annealing installation.

Our engineers will be glad to discuss how Selas Gradiation methods can be tailored to your strip heat-processing needs. Address Dept. 111, Selas Corporation of America, Dresher, Pa.

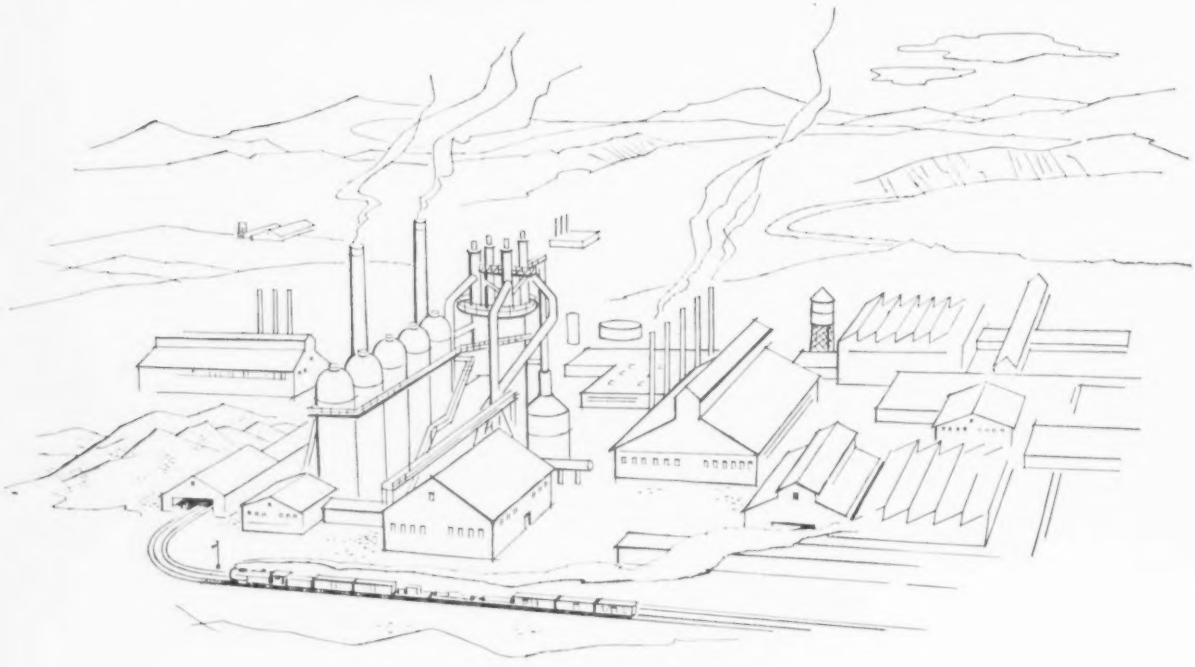
SELAS
CORPORATION OF AMERICA
DRESHER, PENNSYLVANIA

Heat and Fluid Processing Engineers

DEVELOPMENT • DESIGN • CONSTRUCTION



Production is smooth as water rolling off your back!



No wonder: **SKF**® has developed a roll neck mounting that meets the demands for higher speeds, closer gauge tolerances, better quality and heavier rolling loads. This multi-row has the features desired by every mill man – most usable capacity in a given space... easy to assemble and disassemble... uses oil or grease, even at high finishing stand speeds.

When you install a new mill, make sure it is equipped with **SKF** multi-row cylindricals. Or have an **SKF** engineer explain how your present mill can be changed over at minimum cost to eliminate roll neck troubles such as breakage, scuffing, excessive bearing failures or high maintenance time and cost. 7737

SKF

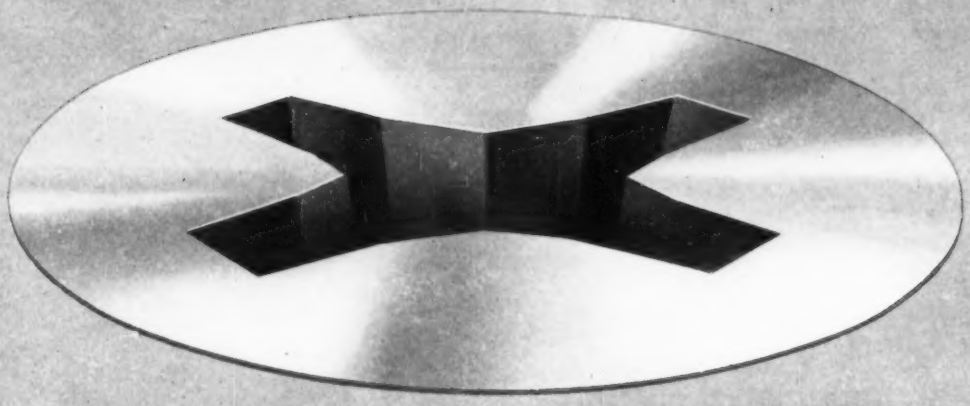
EVERY TYPE—EVERY USE

- *Ball Bearings*
- *Cylindrical Roller Bearings*
- *Spherical Roller Bearings*
- *Tapered Roller Bearings* ("Tyson")

® Reg. U.S. Pat. Off. Tyson Bearing Corporation

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

Cut assembly time—lower production cost



with

PHILLIPS CROSS-RECESSED HEAD SCREWS

Be Sure — Select The Best

There are many manufacturers of Phillips Cross-Recessed Head Screws. It is important for you to know that some of them are members of Screw Research Association for this major purpose:

To make sure that the quality of their products remains the very highest regardless of competition. They accomplish this by rigidly controlling manufacture according to the standards set up by their Phillips Cross-Recessed Head Standards Committee.

Consistent good quality fasteners for your products from these reliable sources are assured by common adherence to precision accuracy of dimensional standards, inspection gauges and gauging methods established by the Phillips Cross-Recessed Head Standards Committee sponsored by Screw Research Association.

You can rely upon these sources for product reliability which assures correct mating fit between recess and driving point. This eliminates driver slippage, and prolongs driver and bit life, improves product appearance and reduces your costs.

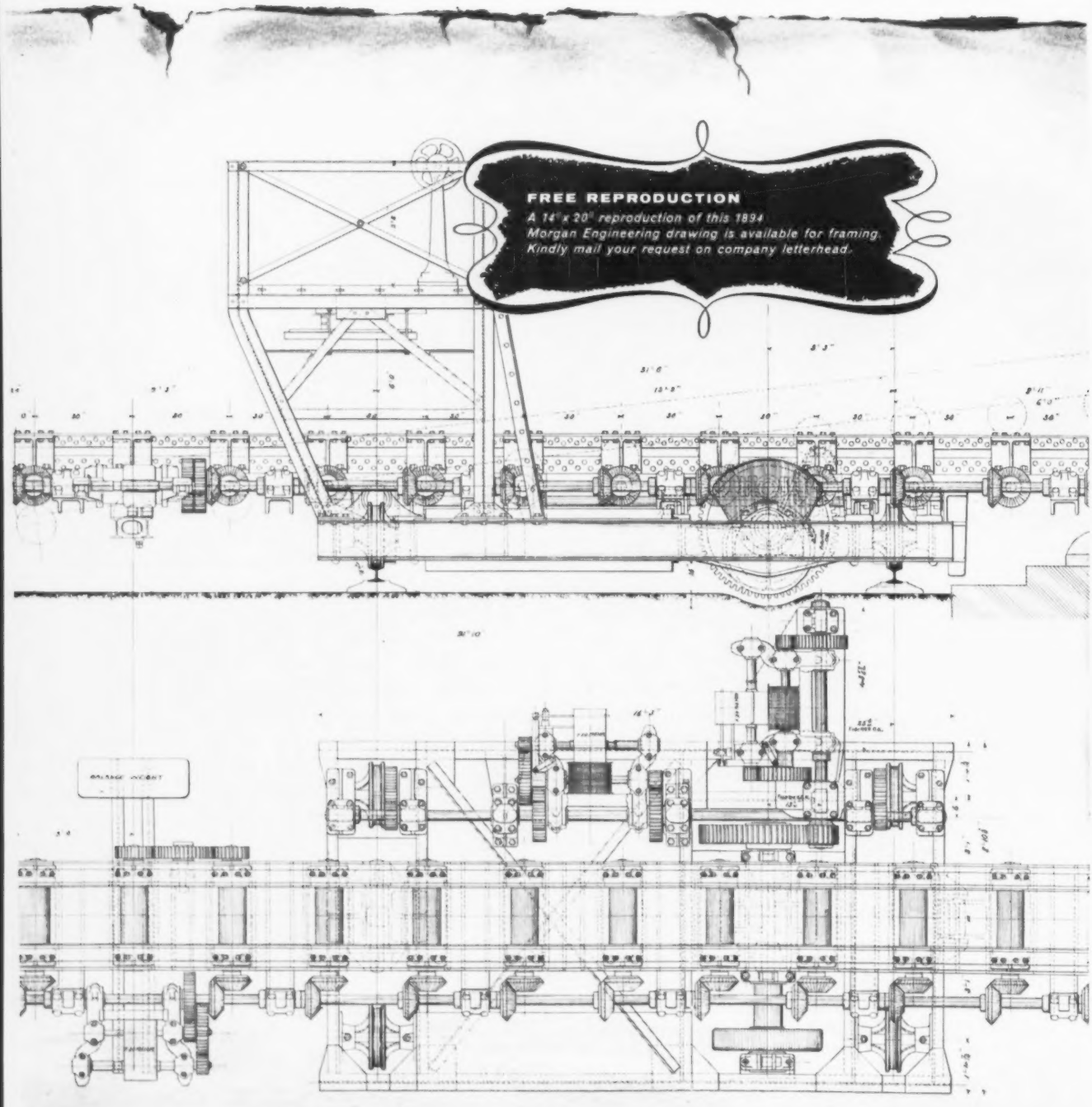
Members of Screw Research Association . . .

You can rely on these sources . . . for product reliability

American Screw Company • Atlantic Screw Works, Inc. • The Blake & Johnson Co. • Central Screw Company • Continental Screw Co. • Elco Tool and Screw Corporation • Great Lakes Screw Corp. • The H. M. Harper Company • The Lamson & Sessions Company • National Lock Company • The National Screw & Manufacturing Company • Parker-Kalon Division, General American Transportation Corporation • Pheoll Manufacturing Co. • The Progressive Manufacturing Company Division, The Torrington Company • Scovill Manufacturing Company • Shakeproof Division Illinois Tool Works • The Southington Hdwe. Mfg. Company Sterling Bolt Company • Universal Screw Company • Wales-Beech Corporation

WE grow our own SKILLED

...TO ASSURE THE QUALITY OF

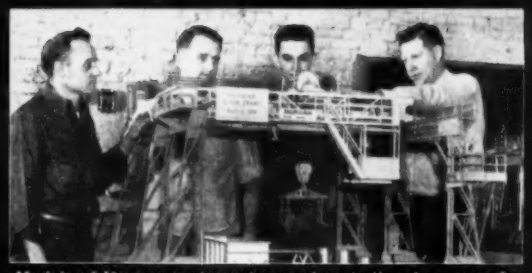


FREE REPRODUCTION

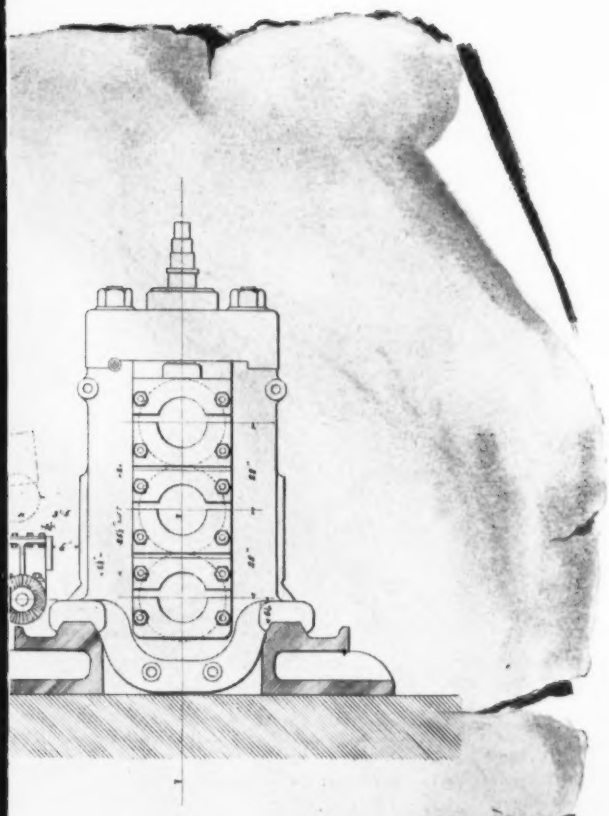
A 14" x 20" reproduction of this 1894 Morgan Engineering drawing is available for framing. Kindly mail your request on company letterhead.

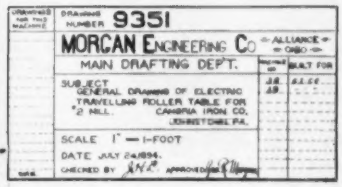
WORKMEN

MORGAN EQUIPMENT



Models of Morgan equipment are set up in the classroom. An apprentice who will work on a giant 500-ton ladle crane learns how his job will influence the crane's overall performance.




DRAWING NUMBER 9351
MORGAN ENGINEERING CO.
ALLIANCE OHIO
MAIN DRAFTING DEPT.
SUBJECT GENERAL DRAWING OF ELECTRIC TRAVELLING ROLLER TABLE FOR 2 MILL CAMBRIA IRON CO. JOHNSTOWN PA.
SCALE 1" — 1-FOOT
DATE JULY 24/1894.
CHECKED BY

Today, a large percentage of the skilled craftsmen, engineers and supervisors responsible for the construction of Morgan cranes and mill equipment are graduates of our own training program. Morgan Engineering's nationally recognized apprentice program provides 4 years (8400 hours) of carefully planned and supervised shop and classroom training. Applicants far outnumber openings. We are able to select men with the most desirable attitudes and aptitudes for exacting work . . . to develop their skills and a keen sense of responsibility for the overall performance of every Morgan-built product.

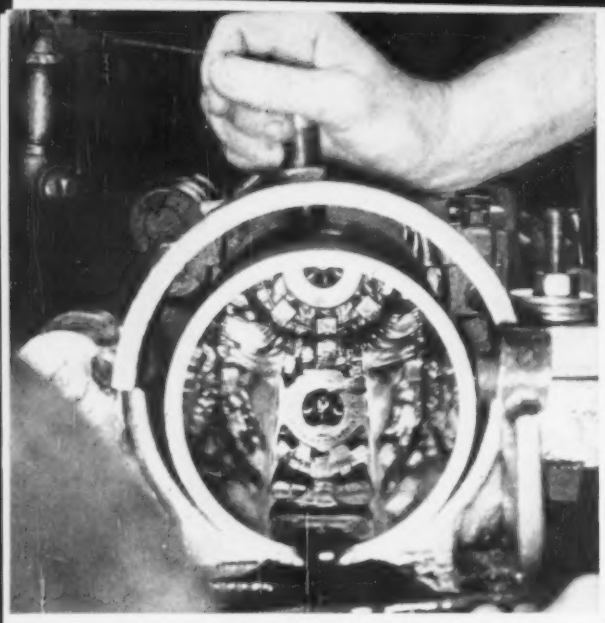
Morgan Engineering's apprentice program was started in 1890 . . . to develop *real craftsmen* who would safeguard our reputation for carefully controlled quality in every detail of design and construction. This kind of far-sighted planning is one of the reasons why industry has always been able to rely on Morgan equipment for efficient, dependable, long-lived performance . . . in cranes, mills, roller tables, shears, saws, presses and other Morgan products which are handling the big jobs and the tough ones.

Let our representative show you how to speed production and lower costs with equipment designed and built by Morgan.

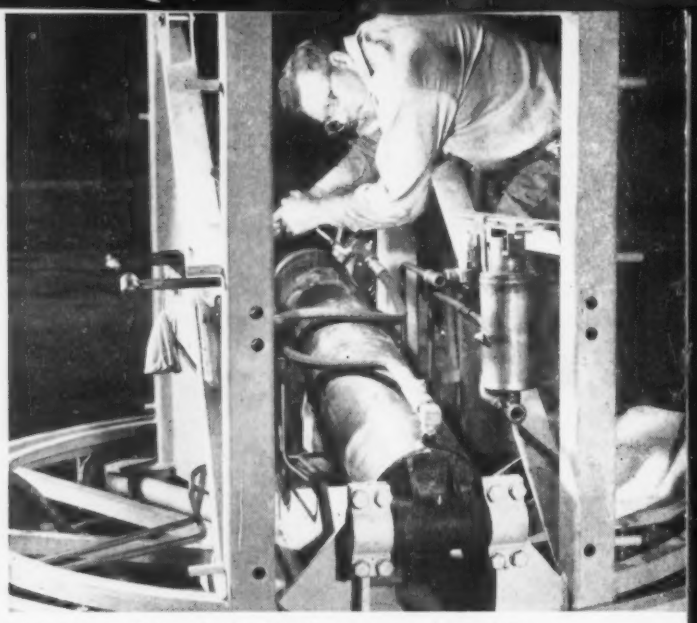
Apprentices see all types of custom-built equipment on Morgan's huge erection floor. Shown, a back mill table for a slabbing and blooming mill.

THE
MORGAN
ENGINEERING CO. *Alliance, Ohio*

Overhead Electric Traveling Cranes
Gantry Cranes • Open Hearth Special Cranes
Plate Mills • Blooming Mills • Structural Mills
Shears • Saws and Auxiliary Equipment



Horizontal honing of Pittsburgh Steel tubes is an exacting process. Inside the tube, you can see part of the hones. At the end of the tube, the hones are mirrored on polished steel.



Finished cylinder is installed on turntable of Pitman Giraffe. This cylinder supports and moves the lower boom. Completed Giraffe will be mounted on truck supplied by customer.

All Giraffe hydraulic cylinders are made from tubing produced by the Tube Mills of Pittsburgh Steel Company and sold by the Kansas City distributor, Metal Goods Corporation.

"We get high production from tubes because Pittsburgh tubes hold to close tolerances," declared Arthur Moore, vice president and general manager of Pitman Manufacturing. He added:

"We give Pittsburgh Steel tubes credit for cutting our scrap losses. But economy isn't all we're thinking of. Since we never forget that men's lives depend on our cylinders we build a safety factor of at least three into every cylinder. We've never had a burst cylinder or a cylinder wall failure with Pittsburgh tubes.

"Finally, Pittsburgh Steel gives us the kind of service we like."

Mr. Moore said engineers from Pittsburgh Steel helped analyze the company's tube problems, suggested some design changes and took Pitman's prints back to the mill to make tubing which exactly fills the bill.

"The service which Pittsburgh Steel instituted ended our tubing problems," said Mr. Moore. "Our cylinders have been very satisfactory ever since."

Whether you make hydraulic cylinders or use seamless mechanical tubing in another application needing uniformity, close tolerances and engineering help, you can profit by Pitman's experience.

Start today by getting in touch with trained help available through any Pittsburgh Steel Company District Office or from one of the Pittsburgh Steel distributors listed at right.

Fire-fighting is just one of many uses for the Pitman Giraffe. These firefighters can move their platform to any given spot quickly and easily without losing time when time counts most.

Pittsburgh Seamless Distributors

Baker Steel & Tube Company
Los Angeles, California

Chicago Tube & Iron Company
Chicago, Illinois

Cleveland Tool & Supply Co.
Cleveland, Ohio

Drummond McCall & Co., Ltd.
Montreal, Quebec, Canada

Edgcomb Steel Company
Philadelphia, Pennsylvania

Gilmore Steel & Supply Co.
San Francisco, California

Earle M. Jorgensen Co.

Perry Kilsby, Inc.
Los Angeles, California

Mapes & Sprowl Steel Co.
Union, New Jersey

Metal Goods Corporation
St. Louis, Missouri

Miller Steel Company, Inc.
Hillside, New Jersey

A. B. Murray Co., Inc.
Elizabeth, New Jersey

Ryerson, Joseph T. & Son, Inc.
Chicago, Illinois

Solar Steel Corporation
Cleveland, Ohio

Steel Sales Corporation
Chicago, Illinois

Tubular Sales
Detroit, Michigan

Ward Steel Service Company
Dayton, Ohio

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

District Sales Offices

Atlanta, Chicago, Cleveland, Dallas, Dayton, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Tulsa, Warren, Ohio

NEW: ***Man-made Giraffe***

Unique Aerial Platform Moves On Cylinders Made From Pittsburgh Tubes

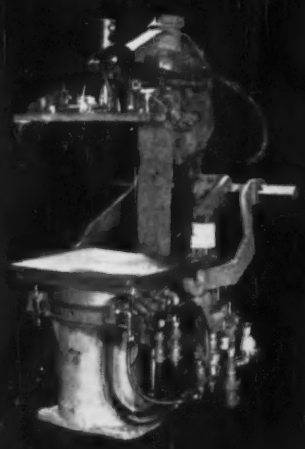
Giraffes are big business at Pitman Manufacturing Company.

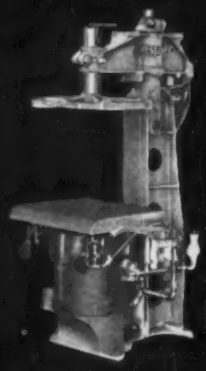
Not the giraffes of the animal kingdom but ingenious hydraulic aerial platforms. These mechanical "Giraffes" are used for anything from de-icing a giant Air Force bomber to fighting fires in tall buildings.

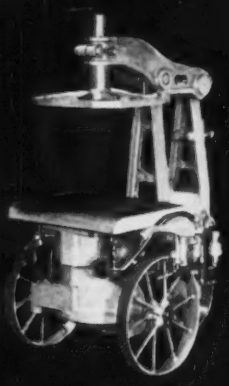
Pitman's truck-mounted Giraffes depend on hydraulic cylinders made exclusively of Pittsburgh Steel Company's seamless mechanical tubes. Giraffes are finding wide acceptance in varied industries because:

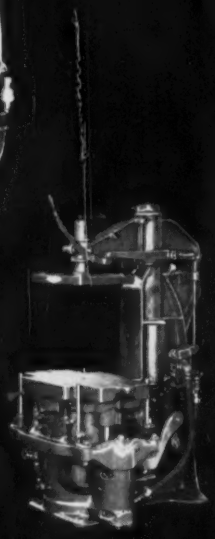
- Workmen can reach heights up to 65 feet in a fraction of the time and cost required by other methods. And their tools go up right with them.
- The roomy, insulated platform carries two men who can control all platform movements with controls duplicating those on the ground.
- The aerial platform can rotate a full 360 degrees in either direction in a radius as great as 35 feet.
- The largest of three models permits the 31-foot upper boom to move in a 160-degree vertical arc. The 23-foot lower boom can move in an 80-degree arc, so workmen can reach the exact spot they want.
- Hydraulic outriggers, operated independently, are raised or lowered by moving hand levers at side of truck.

Since hydraulic cylinders are vital to safe, dependable, economic operation of the Giraffe, Pitman makes its own cylinders with great care.









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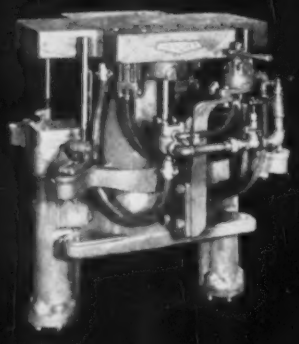
Always specify...

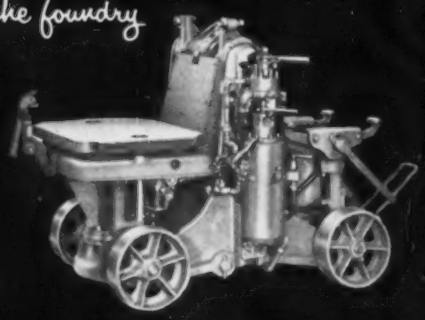
Whether you're interested in short runs or mass-production of molds and cores, you'll find the best machine for every job in Osborn's complete line of Foundry Production Machinery.

When you're expanding, replacing or automating your production facilities—always specify . . . OSBORN. For further details, write The Osborn Manufacturing Company, Dept. FF-59, Cleveland 14, Ohio.

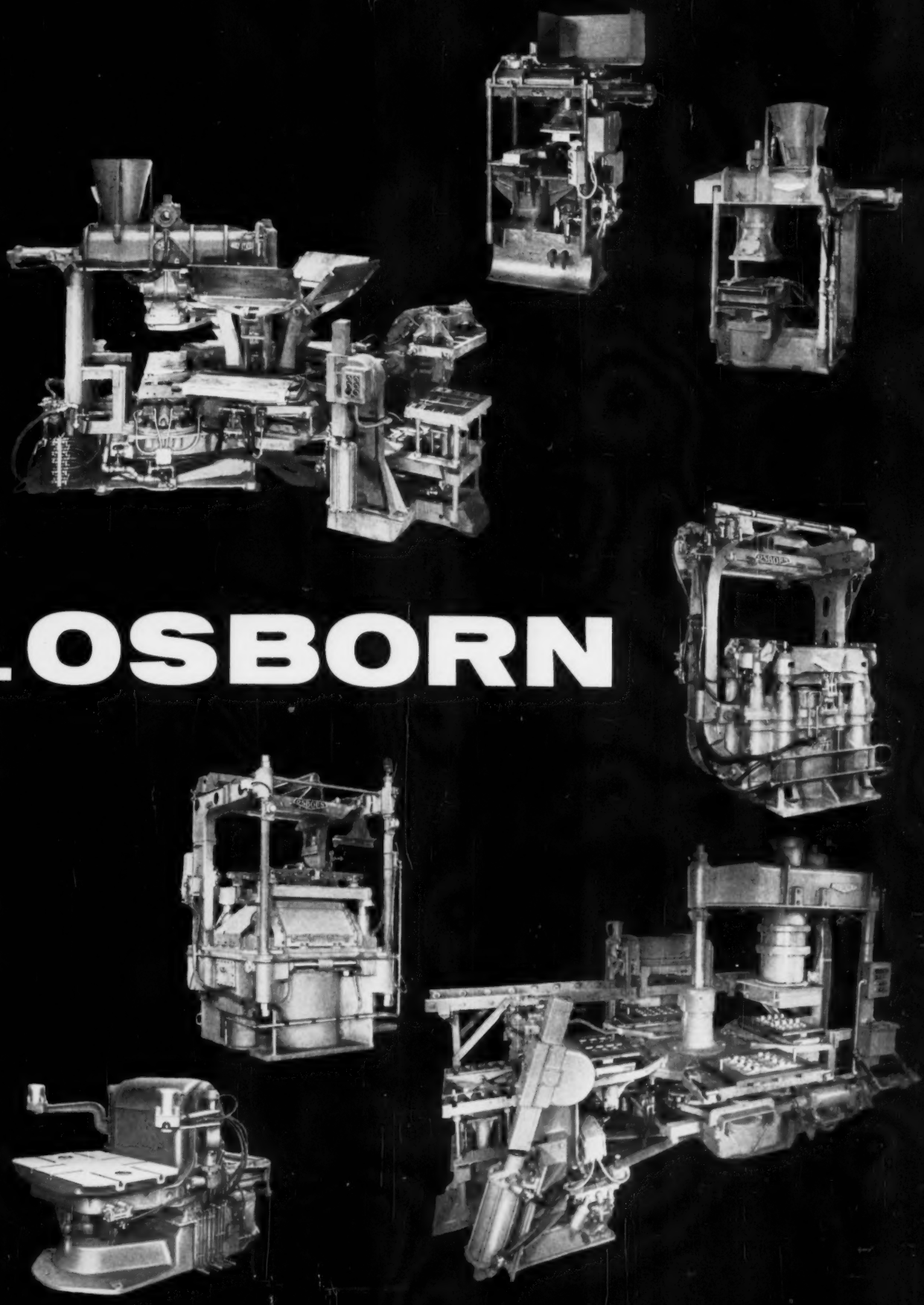
OSBORN® ... leader in mechanization for the foundry

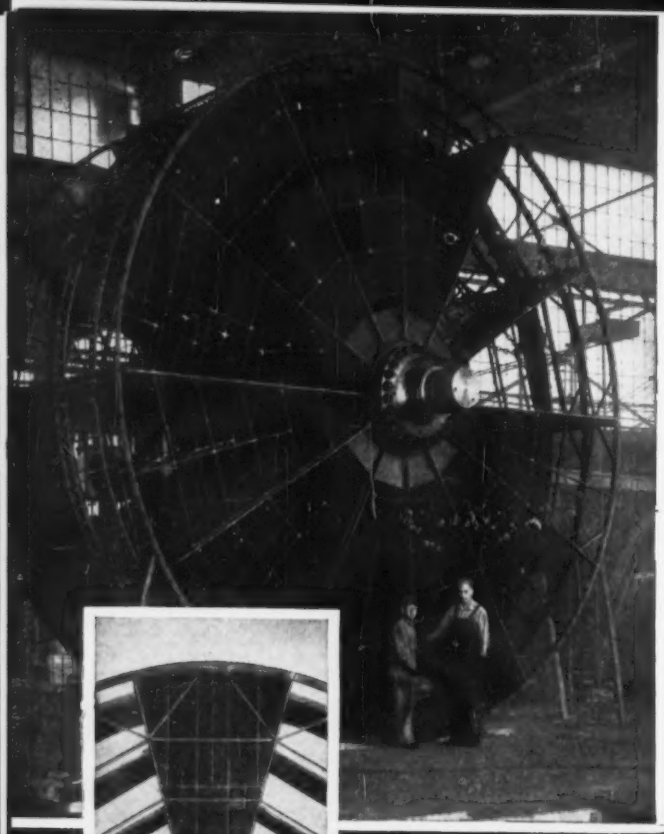
MOLDING MACHINES
CORE BLOWERS
INDUSTRIAL BRUSHES
BRUSHING MACHINES





MEMBER FEMA


...OSBORN

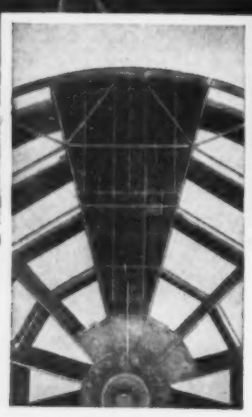


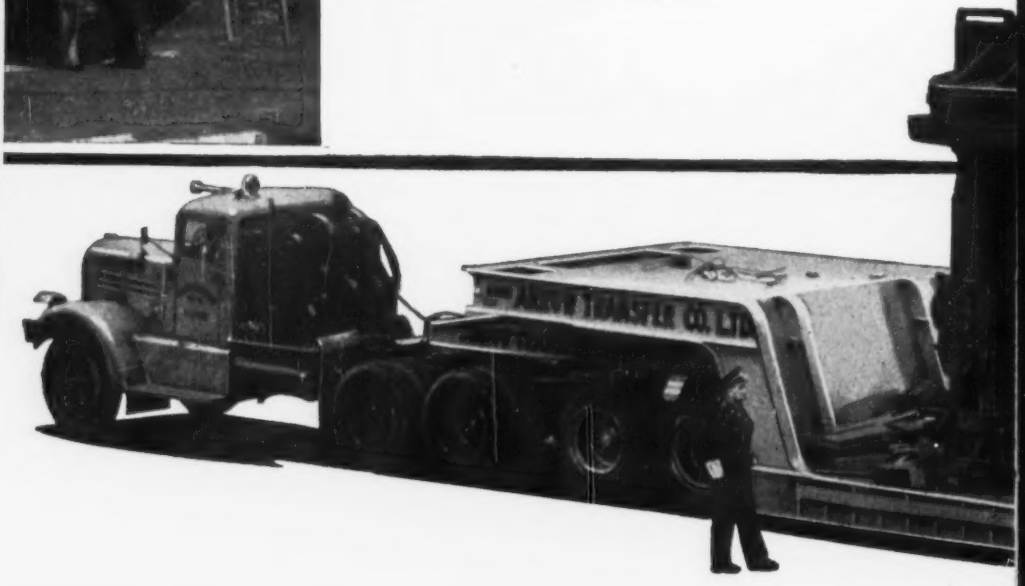
INCREASES CORROSION RESISTANCE. The huge rotor illustrated here is the main structural component of a Ljungstrom Horizontal Air Preheater. Three of these units, designed to serve a 1,900,000 pounds-per-hour-capacity boiler, are among the largest ever manufactured by The Air Preheater Corporation, New York. Each complete preheater weighs 270 tons. The rotor itself—25'2" in diameter and 10'10½" deep—when fully loaded with the heating element, weighs about 390,000 lbs.

Because sulfur in the gases combines with moisture—sulfuric acid is formed when the temperature drops below the dew point at the "cold" end of the rotor—corrosive action can be highly severe in this area. Corrosion means maintenance.

Aiming at a reduction in maintenance, the manufacturer cooperated with the U. S. Bureau of Mines in exhaustive tests to determine the corrosion resistance of various materials under sulfuric acid attack in air preheaters. These tests, made over a 5½-year period, showed that the corrosion rate of low-alloy USS COR-TEN Steel was *lower* than all but one of the *high* alloy steels tested, was less than one-half that of carbon steel and less than one-fourth that of cast iron.

As a consequence, USS COR-TEN Steel is specified for the cold end heating elements and containing baskets on all conventional boiler applications. Where unusually severe corrosion is anticipated, USS COR-TEN Steel is also specified in all or part of the rotor including diaphragm plates, bar stock, rim angle and filler plates.





INCREASES DURABILITY, REDUCES COST. Tote boxes have to take quite a beating. Used for handling, storing and shipping automotive and other parts, they must be able to withstand plenty of rough treatment.

That's why the "Hamlintainer" shown here—a *collapsible* tote box that sets up and folds flat in less than 20 seconds—is now built entirely of USS COR-TEN Steel. COR-TEN Steel's greater strength, 50% higher than carbon steel, makes it possible to build the "Hamlintainer" up to 100 lbs. lighter than carbon steel units, yet so strong and rigid that it will withstand long and rugged service and is not susceptible to bending and distortion. The fact that the COR-TEN Steel ends and sides have the stamina needed to permanently maintain their shape is of utmost importance. It means that throughout its long life the box will always be easy to set up, fold and stack flat.

As compared to the metal construction used in an earlier design, USS COR-TEN Steel makes the "Hamlintainer" not only stronger, more rigid and more durable but also less costly to produce, according to the manufacturer, Hamlin Metal Products Co., Akron, Ohio.

UNITED STATES STEEL
USS
HIGH STRENGTH STEELS
1933 1957
24 YEARS OF PERFORMANCE

High-strength USS COR-TEN Steel pays off in equipment like this

What does your product need to make it better? Greater durability? Bigger capacity? Cheaper maintenance? Lower operating cost?

Do you want to make it stronger, lighter in weight, more corrosion resistant, better able to withstand abrasion, impact and fatigue?

You can obtain any or all of these important money-saving benefits—at little or no increase in cost—by the proper use of high-strength low-alloy USS COR-TEN Steel.

USS COR-TEN Steel is distinguished by its superior resistance to atmospheric corrosion—4 to 6 times that of carbon steel, 2 to 3 times that of copper steel.

In thickness of ½" and under, COR-TEN Steel has a minimum yield point of 50,000 psi and a minimum tensile strength of 70,000 psi. In resistance to abrasion, shock and impact, it is superior to structural carbon steel. Its fatigue resistance is 60% greater.

Thus, when used to directly replace carbon steel, USS COR-TEN Steel will materially increase the strength and durability of vital parts *without* increasing their weight. Or it can be used in thinner sections (1) to reduce weight without sacrificing strength or (2) to increase the capacity of equipment without increasing gross weight or the power required to move it.

You will find our 174-page "Design Manual for High Strength Steels" extremely useful in applying USS COR-TEN or our other High Strength Steels, USS MAN-TEN and USS TRI-TEN "E" to your product. For free copy, simply write on your company letterhead to United States Steel, Room 2801, 525 William Penn Place, Pittsburgh 30, Pa.

INCREASES STRENGTH, SAVES WEIGHT. Shown here hauling a 117-ton transformer, this 150-ton-capacity trailer—built by Columbia Trailer Company, Vancouver, B. C., for the Arrow Transfer Company of that city—is the largest trailer ever built in Canada.

This 80-ft.-long trailer is constructed almost entirely of USS COR-TEN Steel. It is about 25% lighter than if it had been built of structural carbon steel. Specifically designed for handling transformers of giant size, it has a depressed center deck which makes loading and unloading easier and keeps center of gravity low to prevent danger of upset.

Says the manufacturer: "We have found that when a trailer is made from structural carbon steel there is a greater possibility that it can be permanently damaged from overloading than in the case of a similar unit made from high strength steels. That's why, in designing trailers of this type, we always use USS COR-TEN Steel. This construction gives us the high strength needed, plus excellent corrosion resistance and freedom from excess weight—all very important in equipment like this."

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
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USS HIGH STRENGTH STEELS

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UNITED STATES STEEL

Picture of Five Wheelbarrows

What makes an HA PAYLOADER® best for your job?

Shortest turning radius
Higher dumping height
Biggest Bucket (18 cu. ft. payload)
Hydraulic load-shock-absorber
40° bucket tip-back at ground level
Exclusive one-lever bucket control

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Send data on "PAYLOADER" tractor-shovels
☐ Models HA (18 cu. ft.) and HAH (1 cu. yd.)
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Of course you don't see 5 wheelbarrows, but you do see one man on a model HA "PAYLOADER" at the foundry of Domestic Pump & Mfg. Co., Shippensburg, Pa., and the management says it does as much work as 5 men with wheelbarrows handling sand, castings and scrap. Foundries and metal-working plants everywhere like this "PAYLOADER" because it can travel and work where others can't — negotiate narrow aisles, boxcar doors and corners. Yet it boasts a bigger bucket (18 cu. ft. payload) and can dig more, carry more and deliver more tonnage than any tractor-shovel anywhere near its size.

It will pay you to find out what this new style model HA or a larger "PAYLOADER" can do for you. Your nearby Distributor is willing to demonstrate and also tell you about the extra useful attachments — sweeper, fork lift, tine bucket, snow plow, etc. See him today.

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6 stand continuous horizontal

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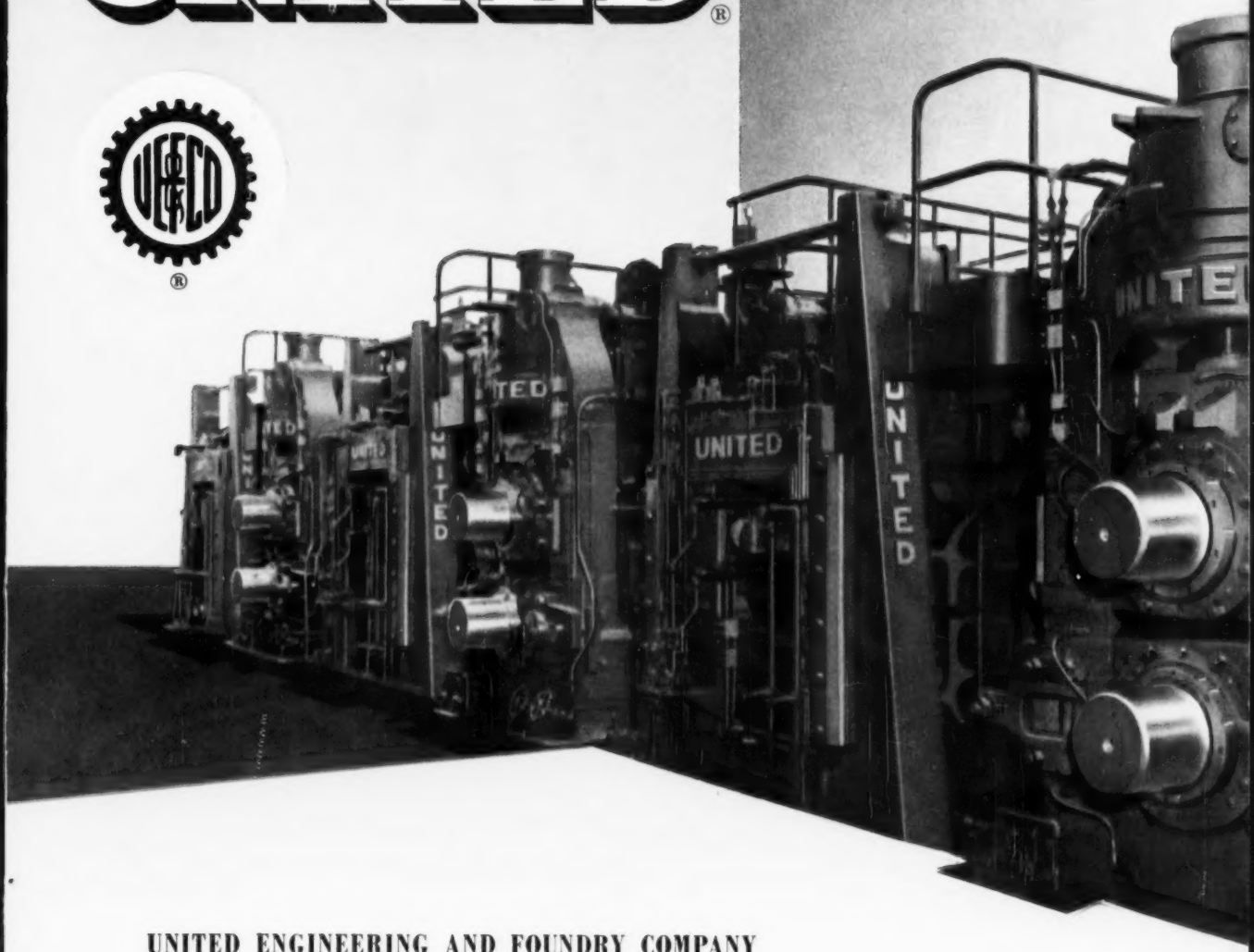

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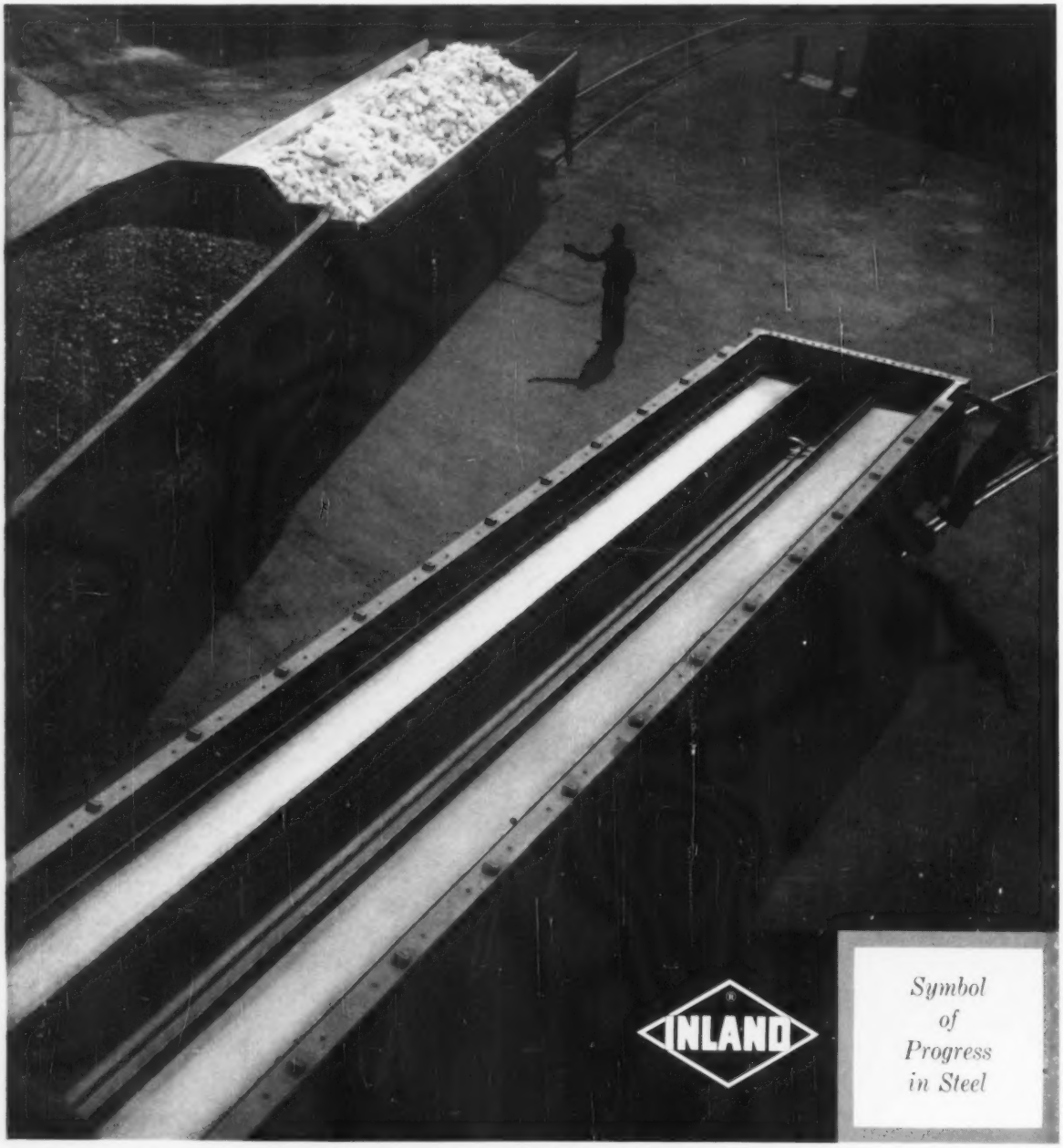
Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other Heavy Machinery. Manufacturers of Iron, Nodular Iron and Steel Castings, and Weldments.

Change trains at Indiana Harbor

Iron ore, coal and limestone from Inland's own mines and quarries funnel into one of the world's largest steel plants . . . at Indiana Harbor. Here they "change trains." But, before they do, they themselves are changed into many useful steel mill products. Every step of this transformation takes place in Inland furnaces and mills, with Inland people supervising, testing, inspecting and performing every operation. This complete control of steelmaking, from raw material to finished product, means fine, uniform steels shipment after shipment.



INLAND STEEL COMPANY • 38 South Dearborn Street • Chicago 3, Illinois

Sales Offices: Chicago • Milwaukee • St. Paul • Davenport • St. Louis • Kansas City • Indianapolis • Detroit • New York

Disposable Hot Top

A new hot top developed in Europe is quietly hanging up new records for killed steel ingot yield. Users report increases running to 8.5 pct —as much as half a ton of steel saved on a six-ton ingot. Lightweight and easy to handle, it goes on the mold in a few minutes, then burns to supply additional heat and slow solidification of the molten metal. And it costs about two-thirds less than conventional types.

Reds Do It Faster

In this country, most gas carburizing of steel is done at carburizing temperatures of 1700° to 1735°F. Russian researchers now claim that faster and more efficient results can be obtained at temperatures of 1920° to 1930°F. In tests on Russian low-alloy carburizing grades, the carburizing rate was actually trebled. Austenitic grain growth was not appreciable, nor were mechanical properties of the steels impaired.

More Atom Permits

Industry's demand for atomic construction permits is still on the increase. So far, Atomic Energy Commission access permits have been issued to 1,145 firms in about 40 industry groups —among them 21 aircraft builders, 24 in electronics, 45 making machinery, 158 in metal manufacturing, and 7 scrap and waste disposal companies.

Unit Is Its Own Boss

An automatic assembly machine which fastens electronic components to printed-circuit panels actually takes orders from itself. Instead of being manually reset when layout changes are made, the new machine gets instructions from punch cards and automatically resets itself for the new assignment. Adaptable to a variety of board assemblies, it can insert one component every second.

Office Away From Home

Traveling men have been quick to take advantage of a friendly new service offered by a midwestern steel-products distributor. The firm recently invited its customers to set up temporary business headquarters at its new plant in Chicago anytime they're passing through the Windy City. Two modern conference rooms are available, complete with air-conditioning and direct-dial telephones. The firm's receptionist handles incoming calls and mail addressed to the visitor.

Steel Process To Grow

Interest in the Stora oxygen steelmaking process continues to spread. A French steelmaker has just closed a deal to build the second commercial installation in Europe (the first is now building in Sweden). Several American steel companies are studying the process carefully, and an important steel founder is in the midst of negotiations which may make it the first American user. Meanwhile, Stora is continuing test runs with low phosphorous American-type ores.

Slack Quenching

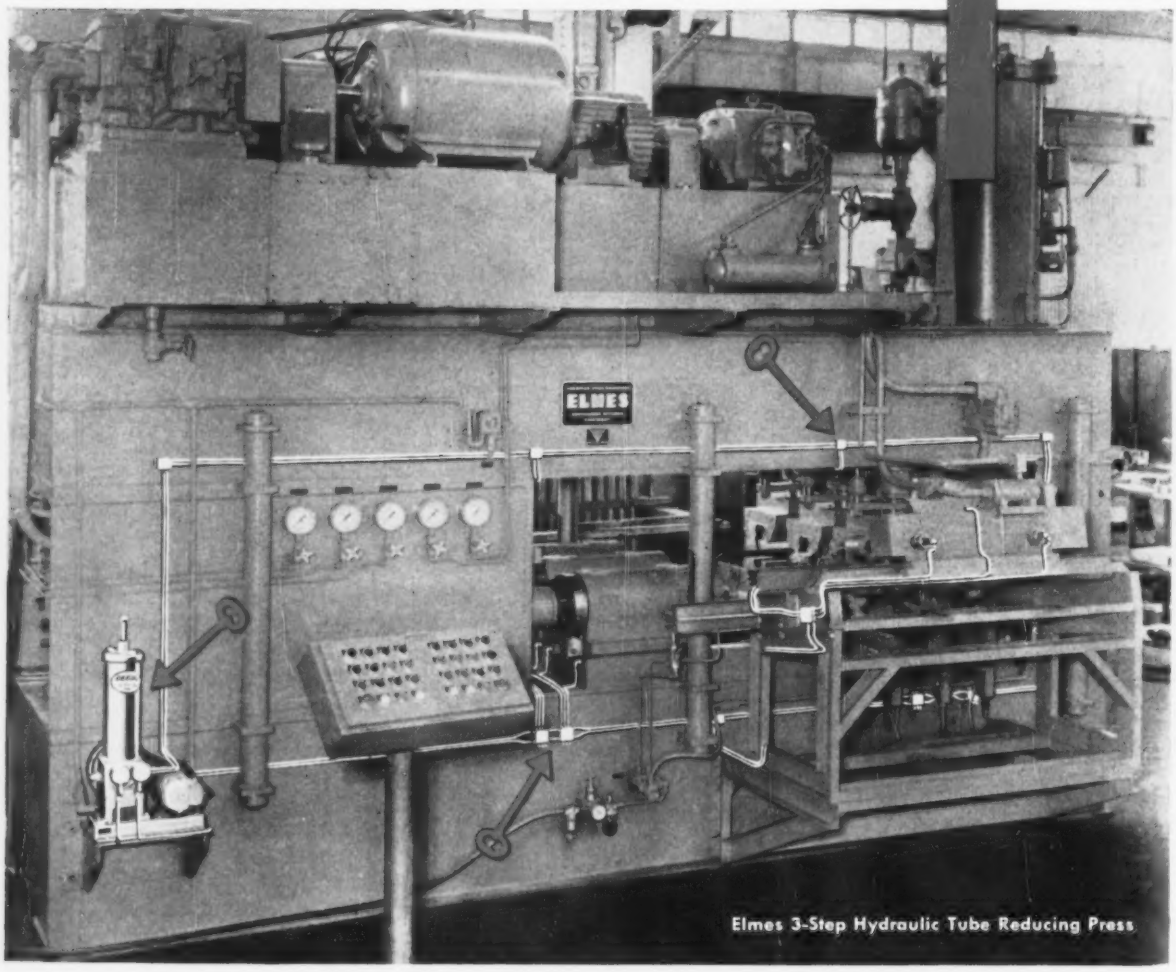
Nobody wants a slack-quenched steel. Still, the slack-quenching effect can't be avoided in plain carbon steels with large cross-sections. While the National Bureau of Standards doesn't claim to have solved the problem, it has developed an accurate method for measuring the effect of slack-quenching on impact resistance. Thus, the risks of slack-quenching can be predicted prior to service.

Makes Two Equal Three

A new method of cold-reducing hot-rolled steel bars saves one ton in every three in the mass production of multi-diameter machine shafts. It involves pushing dies over the die form blank from opposite ends to the desired distance and stripping them off again. On auto transmission shafts, 200 tons of hot-rolled bars made the equivalent of 300 tons of cold-drawn bar stock. And a gun-maker cut steel needs 45 pct on rifle barrels.

Never a holdup or slowdown to lubricate this tube reducer in Michigan auto factory

FARVAL—
Studies in Centralized Lubrication
No. 203



Elmes 3-Step Hydraulic Tube Reducing Press

● With automation, centralized lubrication is a must. What automated line can afford to slow down or shut down because a forgotten bearing has run dry?

Equipped with Farval, any machine can operate continuously, day and night, with never a pause for lubrication nor a shutdown for a burned-out bearing.

Farval delivers a measured amount of clean oil or grease to every bearing served, at any desired, predetermined interval. No bearing is ever missed—and the amount of lubricant delivered to any one bearing can be varied without affecting the rest of the system. Guesswork and hit-and-miss hand oiling are eliminated with Farval.

A Farval Centralized Lubrication System, manual or automatic, is easily designed into any machine. Let us send a representative to discuss application of Farval to your equipment. Drop us a line. Also ask for Bulletin 26-S. The Farval Corporation, 3282East 80th Street, Cleveland 4, Ohio.

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KEYS TO ADEQUATE LUBRICATION—

Wherever you see the sign of Farval—the familiar central pumping station, dual lubricant lines and valve manifolds—you know a machine is being properly lubricated.

This *Farvalized* machine is an Elmes 60-ton Tube Reducer. In three steps it reduces tubing for drive shafts for a well-known Michigan-made automobile.

FARVAL
CENTRALIZED SYSTEMS OF LUBRICATION

George Meany

Can he hold AFL-CIO together?

Walter Reuther

Will he trade 32-hour week for dollars?

David McDonald

Can he stabilize his own position?

Labor's New Problems— They'll Affect Your Bargaining

Personalities Figure in Union Tactics

Labor may be at a crossroads. Recent congressional hearings and internal problems have created an entire new set of pressures on labor leaders. These pressures will be felt by business in the next few years.

Here's a long look at the broad picture of organized labor, how its problems and the personalities will affect future negotiations in major industries. —By Tom Campbell.

▪ Labor is putting on a mammoth three ring circus. The show will last quite awhile—to July 1, 1959 at least. The outcome is by no means certain. It depends upon the actors—all of whom are topnotch in their field.

The plays: George Meany, AFL-CIO chief, must keep the pendulum from swinging too far to the right and knocking the head of labor to the wall; Walter Reuther, United Auto Workers' head, must do something right nice for skilled auto workers or suffer the consequences; David McDonald, Steelworkers' president, must reestablish his prestige in his own union, go one up on Reuther and make book for the 1961 presidential election in his union.

Public Who Pays—Management is the unwilling angel for this show. The public, as the audience, must as usual pay the final bill. But this time there is already enough evidence to show that the angel and the audience may balk much

quicker than in past years. It is in that atmosphere that labor faces its hardest bumps since it got too big for some of its breeches.

Stolid, executive-type George Meany is trying to offset the bad effects of the Senate racket hearings which have disclosed serious shenanigans in some of labor's mansions. But at the same time, Mr. Meany is charged with the awful responsibility of keeping the AFL-CIO from coming apart at the seams. If he goes too fast on kicking unions out of the combine, he could furnish the impetus for building up a hydra-headed competitor which could bust American labor wide open.

Meany's Position — Mr. Meany will go slow, keep his mouth shut most of the time, agree that the law must take care of racketeers. He will plug for a close adherence to the AFL-CIO ethical standards and stand or fall on his uncompromising attitude against labor's enemies from within. Personally he abhors the press labor is getting and he is worried about the effects of the Senate disclosures. He is too realistic to think that the smell will blow over quickly or that most people will automatically refrain from judging the whole labor movement upon the stupidity and crookedness of a few.

Even before labor began to get a national black eye via the Washington sideshow, Mr. Meany was having trouble within the AFL-CIO trying to weld together the two "merged" groups. Now his job is doubly hard. But the latest from those who have his ear is this: George Meany will not pussyfoot or pass out pious statements—he will put the full impact of his authority and personality towards cleaning up labor's stables; even if it means g a m b l i n g with the teamsters place in the AFL-CIO.

Reuther's Acrobatics — While Mr. Meany does his juggling act in the white glare of public heat, Mr. Reuther's ring is quite busy, but the show isn't completely open to the public yet. Nothing has come forth yet except the ballyhoo. His bid to "go easy" if car makers cut prices is a publicity stunt. Walter Reuther is playing for high stakes. He wants to be known as the most liberal and the strongest labor man of all times. And of course he wants to run the big show.

He is quite capable of patiently biding his time. His feud with Dave McDonald — or Mr. McDonald's feud with Walter Reuther —boils under the surface. He would probably deny emphatically that there was such a thing. But there is. It is at the bottom of the big price Mr. Reuther wants the auto people to pay come next June 1.

The supplemental unemployment benefits turned out to be not what they were cracked up to be. They did not and they don't please the younger fellows who haven't too much seniority. The youngsters want more money in the envelope. And the skilled workers are quite miffed at the close proximity of the semi-skilled and unskilled rates to their pay scale. That's why the skilled workers—and the white collar workers—can go it alone if they don't like the general contract that covers the average mass production workers.

Short Work Week?—There is a lot of flit blowing around about the 32-hour week, Walter Reuther claims he is serious when he says that is what he is going for this time. He knows as well as anyone else that we still have a shortage of labor and will have for some time. It is doubtful if the auto industry or any other major industry could operate on a 32-hour basis at this time—or at any time in the near future.

Best bet on Mr. Reuther: He will trade dollars for the 32-hour week. It is also a bet that he will keep after the shorter work week and eventually get it just as he got the unemployment benefit plan—unless of course there is a serious depression; and then workers will get even less than a 32-hour week.

Odds Favor Auto Strike — Will there be an auto strike? Most people in labor and in the auto industry think not. But the odds are at least 60-40 favoring an auto strike come next June 1.

Here is why: The public is peeved at the price of new cars. Buyers are beginning to balk. The sales of the so-called "low priced" three are up substantially as a percentage of total cars sold. This brings home the point: A continuation of higher and higher prices for autos has probably reached the point of no return. That's why Mr. Reuther got into the act.

The rat race to make changes and beguile the buyer into spending a big wad of dough for a new car every two, three or four years is getting out of this world. Auto men know now that money doesn't grow on trees. They are not going to be a pushover this time for Walter Reuther's noble experiment — the 32-hour week. And they aren't going to be the fall guy for a wage bill that will rock the car buyer back on his wallet. Somebody has to give before the United Auto Workers sign their new contract come next June 1.

Prediction — Mr. Reuther is building up his case and stamina. The automakers are quietly facing up to reality—it can't go on like this forever; or can it? Prediction: A study of the 32-hour week; a healthy wage boost for skilled workers and a moderate increase for mass production workers plus general fringe refinements.

Walter Reuther is going to get his licks in at Dave McDonald

Turn to Page 70

. . . For Labor Generally

Restrictive laws on use of pension funds, full disclosure of financial condition and better protection for rank and file.

George Meany will not kick the Teamsters out of the AFL-CIO unless there is no other way out: There isn't too big a chance that the Teamsters will go. Danger to the labor movement would be too great.

Mr. Meany will keep Walter Reuther under control but Walter will bide his time hoping to take over later.

No stringent limitation on labor will result from the Senate hearings. The pendulum is swinging to the right, but it won't knock labor's head too hard.

. . . For Walter Reuther

Publicity stunt on offering to go easy on automakers if they cut the price of cars was Mr. Reuther's opening gun to take the offensive in bargaining.

He will trade dollars for the 32-hour week demand. Skilled workers have to get much more.

The 32-hour week will come up at the next session after May 1958. Eventually he'll get it.

Carmakers are afraid that high car prices have reached the point of no return. There is a 60-40 chance of an auto strike next year.

Mr. Reuther will get: No 32-hour week; a good wage increase for skilled labor; a moderate increase for mass production workers; and fringes.

. . . For David McDonald

An attempt to better Walter Reuther on whatever the auto union head gets.

A belated attempt to tighten up his control in the steelworkers after letting things slide. The last election was a shocker for Mr. McDonald.

A 65-35 chance that there will be a long steel strike in 1959.

A much tighter management front in 1959 because of the weariness in having to raise prices every year.

A wage package not quite up to the one gained last year. But with enough cents per hour and fringe refinements to boost prices again in 1959 and each year during the contract. This may not run three years.

Is Two-Man Bargaining on the Way?

Some Advantages — There has been some talk of two-man bargaining for steel; somewhat like the pattern used in the bituminous coal industry.

The proponents of this plan in the steel industry feel that the man for that job is John A. Stephens, U. S. Steel Corp.'s industrial relations veep and veteran negotiator.

Stephens Would Decline — Certainly the steel industry would have a lot to gain by getting their wage hassles out of the public eye for a change. While the current plan of three management men representing the steel industry isn't as unwieldy as the coal sessions used to be, it has its drawbacks. There are many steel firms — aside from the big three — who will probably not go for the two-man plan in the negotiating meetings until they learn the hard way.

Union officials believe that the steel industry would like to have a coal industry type setup for the industry. And many steel people privately think Mr. Stephens is the man. There is only one catch to it: John Stephens will not take the job although he is fully capable of doing it and has the confidence of most steel firms.

Bargaining Setup — Chances are that the next bargaining session between the Steelworkers and the industry will see three top steel negotiators—including Mr. Stephens—with possibly a fourth from Jones & Laughlin. If the union finds it necessary to expand its negotiating team, the steel industry will add to its team man for man.

The two-man bargaining setup for steel is on its way but it may take several years for it to appear.

some way. Mr. McDonald got quite a package in 1956—such a costly one that some steel people are plenty worried about the sequel to it in 1959. All the talk in the world about 1959 being "some time away" doesn't mean a thing. Both Mr. McDonald and the steel leaders are burning some private midnight oil on this question.

McDonald's Tight Rope—Right now Dave McDonald's circus ring is taken up with showing what a clean union he runs in the United Steel Workers of America. But one of Mr. McDonald's secret backstage worries is the instability of his position in the union.

It is a mark of irony that Walter Reuther—who has done the least for his skilled workers, and who has put across more things that make him look big rather than fatten the pay check—is sitting on top of the world with his union people. But Dave McDonald, who has gotten the steelworkers literally bundles of the green stuff plus costly fringes, is having trouble keeping on top of the heap. Who said it is easy to be a labor leader?

Spotlight Turns Back — Whatever Mr. Reuther does in May 1958 — or after a strike in July 1958—Dave McDonald will have to better it when his number comes up in the late spring of 1959.

But Dave McDonald has a lot of book to make before that time. So far, he hasn't tightened up his control of the union. The factors which gave him only two-thirds of the votes at the past election are still there and smouldering.

The steel company "friends" of Mr. McDonald aren't trying to pull the supports out from under him. But they aren't joining any "We like Dave" club either. They have their own troubles with Dave's supporters and with Dave's detractors. Let's face it: This psychological personality split among many Steelworkers' members doesn't make the job of the steel chiefs any easier.

It may be that Dave McDonald will have to cart along a bigger bargaining group when he sits down with the steel people next time. Of course he will have that tight-fisted, brass-knuckled negotiator Arthur J. Goldberg on his right. There is a growing undercurrent of opinion in the Steelworkers that the rank and file should have more representation at the bargaining table. That could be taken care of by adding one or two people—probably someone from the opposition.

Until Mr. McDonald feels on safer ground it will be necessary for him to try to drive as hard a bargain next time as he did last year. It is no secret that steel leaders had to go much further with wage and fringe concessions last year than they ever intended to go. They had felt that Mr. McDonald would have settled for a 5-year contract that would have cost much less a year than the 3-year deal.

Outlook for Next Time — Best prediction on steel for 1959: A stiffening of the backs of all steel firms; a militant demand pattern from the union; a 65-35 chance for a long steel strike followed by another wage round that will cause higher steel prices. This time the union may not be so quick to settle for a 3-year contract: union research men and top bargainers in the AFL-CIO are not so sure they like the non-reopen, 3-year pacts.

Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept., THE IRON AGE, Chestnut & 56th St., Philadelphia 39, Pa.

Will Titanium Beat Setbacks?

More Non-Military Use Would Help Out

Titanium producers, while hurting from loss of military orders this spring, are far from discouraged.

They bank on eventually finding substantial commercial markets.—By G. J. McManus.

▪ Titanium producers were rocked this spring with the news that aircraft cutbacks would sharply reduce military consumption of their metal.

The dust still hasn't settled on that thunderbolt, but here is the outlook at the moment: Titanium shipments will probably total less than 7000 tons this year. That would be 2000 tons more than in 1956 but 3 to 5000 tons under estimated military requirements for the year. And shipments may well drop to 4000 tons in 1958.

Abrupt About Face—These figures represent an abrupt reversal in titanium prospects. Shipments in 1956 doubled the previous year's. In the first quarter of this year, producers were straining to keep up with demand. They had been told military needs would continue rising. They were rushing to double capacity again.

Then in the second quarter came the slowdown order for jet engine production. Titanium shipments coasted along on momentum for several months after a consumption drop was indicated and supply lines became heavily loaded. It's estimated that four million lb of titanium shipped in the first half exceeded consumption by about one million lb.

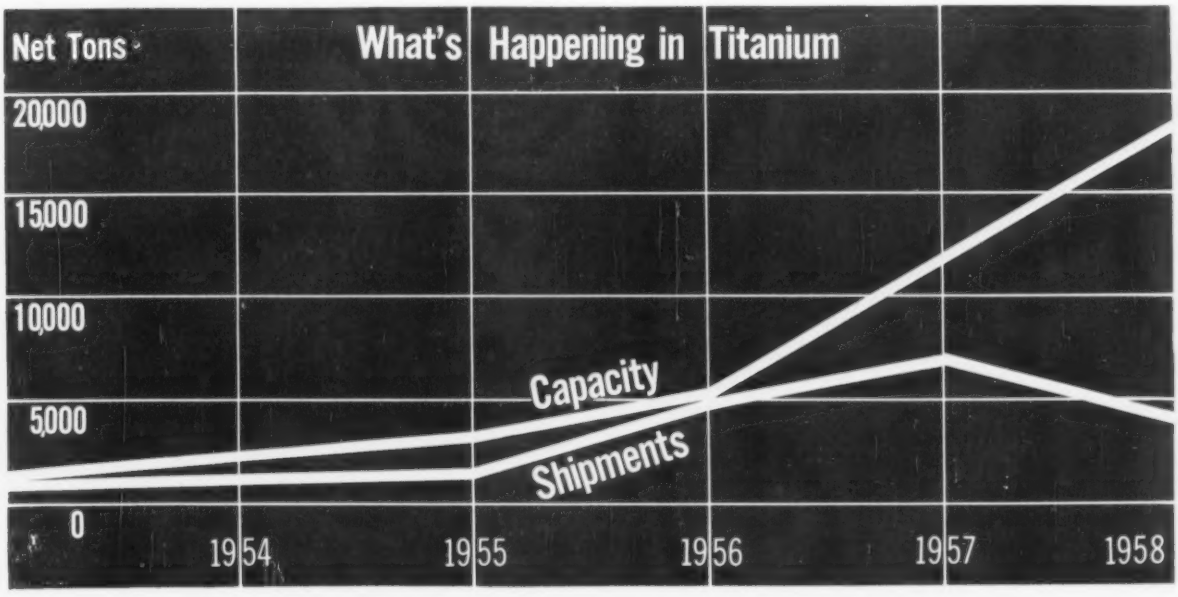
Producers are now feeling the full impact of inventory reductions on top of slashed consumption. The setback is serious but it has not changed the basic thinking of titanium men. A spot check of ore refiners, sponge producers and melt shops shows uniform confidence in the long range future of titanium.

Reasons Why—They reason this way: "Here's a metal with about half the weight of steel and roughly the same strength. It is highly resistant to corrosion. It is the fourth most abundant structural metal in the earth's crust. It is bound to find wide use."

Specialized military applications have played an important and flashy part in titanium's growth. The industry is not giving up on them now. But the money behind titanium has always been aimed at tonnage uses in commercial fields. Somewhere between aluminum and stainless steel, producers see a large home for titanium.

Price Barrier Fading—Commercial development has moved ahead steadily. Rem-Cru Titanium, Inc., says commercial shipments are running about six times over the rate of last year. Another titanium man places the gain at between six and seven times. The corrosion resistance of titanium is bringing growing use in anodizing and chemical processes. Marine, commercial aircraft, petroleum and food processing applications are considered promising.

"The horizon keeps broadening the more you work with titanium,"



says Rem-Cru President C. I. Bradford.

Big obstacles in the way of commercial titanium growth have been high prices, uncertain supply and lack of familiarity on the part of design engineers. The price of titaninum products has been dropping steadily. A sheet grade that would have cost $20 a pound in 1951 now sells for $6.55 a pound, including size extras.

Spreading the Word — Supply is no problem today; producers will have capacity for four times the military requirement by next year. Even if there is a big increase in military orders, the law directs that 10 pct of titanium output must be available for commercial use.

On the question of engineer education, titanium men are busily preaching titanium's advantages. They point out that cost comparisons should be made on a job basis, not just on price per pound, and evaluations should take into consideration future maintenance savings.

Titanium men see continued advances but they don't look for commercial sales to take up the slack left by the military overnight. In 1956, between 97 pct and 99 pct of titanium shipments were for defense use. Production capacity was 3000 tons at the end of 1955. It will be 18,000 tons in 1958.

This expansion was in line with an estimated defense requirement for 1958 of 15,000 tons. The revised estimate of 4000 tons leaves a surplus far above commercial needs at the moment.

Surplus Sponge Capacity — The titanium sponge picture is equally lopsided. By the end of this year, producers are due to have an annual capacity of 41,500 tons. In addition, a sponge reserve has been built up in a revolving government fund. The sponge requirement for next year will probably be under 10,000 tons. A number of planned expansion projects have been held up but there is still a surplus of sponge capacity.

Electricweld at J&L

▪ Jones & Laughlin Steel Corp. is now producing electricweld line pipe on a new $8 million mill at its Aliquippa, Pa., works.

Steel strip or skelp, from 600 to 1000 ft coils, is cold formed into a tubular shape through nine forming stands. The edges are then butted, and welded together (photo above) by electric resistance.

New Features — The new J&L mill, built by McKay Machine Co., Youngstown, and installed by McDowell Co., Cleveland, features pushbutton control, with the speed of each stage synchronizing with the other parts.

Several "firsts" claimed for the setup by J&L: Feeding the 2300-volt current directly to the welding transformer, eliminating intermediate units, and increasing the speed of response; and electronically measured forging pressure (forcing the edges of the strip together) for improved quality.

Steel Shipped In — Hot-rolled coils of strip steel for the mill are now shipped from J&L's Cleveland and Pittsburgh plants, but will come from Aliquippa's new 44-in. hot strip mill when it is completed later this year.

Electricweld line pipe is the fourth product added to the J&L line this year—the others being continuous galvanized sheets, stainless steel, and cold-rolled strip.

The new line pipe will be aimed primarily at oil and gas markets.

Magnesium Holds Market Gains*

It Bucks the Nonferrous Downtrend

Unlike other nonferrous metals, the magnesium industry has healthy second half prospects.

A shift in demand to wrought products indicates rapid growth for immediate future.

▪ There are no real soft spots in the magnesium market. In direct contrast to other major nonferrous metals magnesium producers seem to be at least holding their own in the face of the current business recession.

With first half figures in, key people in the industry are openly optimistic for the second half and the year as a whole. In some areas there are notable advances over 1956.

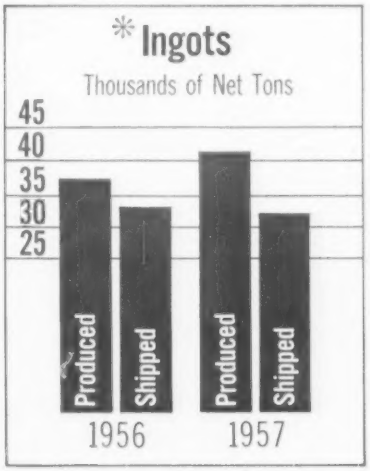
Shift to Wrought—The brightest spot is wrought products — sheet, plate, extrusions, and forgings. Shipments during the first half totaled 6832 tons, up about 2 pct over 1956. But shipments in the last half of 1956 tailed off somewhat. The last six months of 1957 are expected to almost match strides with the first half, for about a 10 pct increase over the previous year.

Wrought product makers consider themselves the future of the industry. They say that most metals which are major industries today started with cast items as key products. But as they got rolling, wrought soon move to the forefront. This is what they predict for magnesium.

Changing Pattern — They point out that wrought product shipments in 1956 totaled about 65 pct of cast shipments. As late as 1953 the tonnage of wrought products shipped was only 40 pct of cast shipments.

This year wrought product makers expect to ship tonnage equivalent to about 70 pct of cast. And they say the day isn't far off when they will ship more than cast product makers.

A Weakness — This does not mean a drop in markets for cast products — sand, die, permanent mold, and anodes. Cast shipments for the first half of 1957 were off slightly from the same period in 1956. But casters expect a strong second half to boost shipments for the year as a whole up to the neighborhood of 1956 levels.



Productwise, the weak sister has been diecastings. The lower price for zinc castings, and the vastly improved delivery schedules of aluminum diecastings has put a competitive edge on the market that it hasn't had before.

The Market Picture — Marketwise, the biggest detriment has been the uncertainty of aircraft building. While missiles and rockets have taken up some of the slack, the stretchout of aircraft contracts has taken the edge off the possibility of improving on 1956 sales.

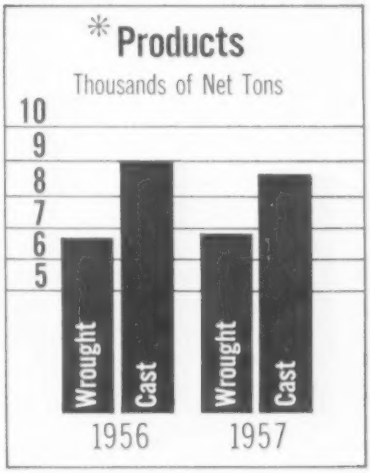
In the long run, casters are confident of an across-the-board growth of the use of magnesium castings in most current markets, with the biggest increase in demand expected from electronic and auto companies.

Report From Dow—Dow Chemical Co., the only primary producer, reports ingot output up 11 pct in the first half of 1957 over the same period in 1956. Currently, Dow is working at an annual rate of 82,000 tons, more than rated capacity. Making allowances for summer slowdowns, output in 1957 should top 75,000 tons.

While most markets have held up well, several weak spots in other nonferrous industries which use magnesium dropped ingot shipments slightly below 1956 levels in the first half.

They include titanium producers who use magnesium in making sponge, and companies making aluminum-magnesium alloys. Uncertainty of the aircraft program has taken the edge off these markets.

Titanium producers, and aluminum-magnesium alloyers are working hand-to-mouth from good stocks of primary magnesium.



Despite this, shipments for all of 1957 are expected to match 1956, and could go higher if weak spots firm up in the fourth quarter.

Note: Charts reflect statistics for the first half of both years.

INCREASING OUTPUT: Machines for sealing capacitors have no idle time at Fansteel Metallurgical Corp.

BIG FUTURE: Demand for these small tantalum capacitors, companion to the transistor, is multiplying.

Transistor Sales Are Skyrocketing

Sales projections for transistors follow a pattern that is increasing geometrically.

Commercial, industrial, and foreign markets have barely been scratched.

▪ The transistor-capacitor sales curve reads like a helicopter flight plan—straight up. The industry has more than it can do to meet existing demand, yet it must plot development of new markets in years ahead.

Total sales of electrical equipment is expected to show an 8 pct gain this year. Transistor shipments, however, are already 115 pct over 1956 and still gaining. The capacitor handmaiden to the transistor is up 30 pct and customers are pounding on suppliers' doors for more.

Reasons for Growth — Radios, both semi-transistorized and fully transistorized models are gulping up most transistor production today. Television set makers are just moving in, will not achieve a real slice of transistor output until at best late in 1958.

Behind the transistor stampede are their advantages in replacement of the conventional vacuum tube: namely, low cost and compactness. Commercial and industrial use is gaining rapidly.

Industrial Potential—Resistance of the tiny transistors to heat, shock, and their low current demands are pushing their use in railway signal systems, domestic and transatlantic telephone relays, and two-way radio. Business machines, already a major consumer, are scheduled to use even more.

Process control equipment on chemical and other liquid product lines is a natural. This market has barely been scratched. Madine tools are now getting their first introduction to the tiny control units possible with transistorized electronic controls. At least one automotive manufacturer has toyed seriously with a transistor controlled fuel injection system.

Export Untouched — Meantime, military demand for transistors and capacitors continues to grow in missiles, aircraft, fire control, communications, radar and navigational equipment.

With the government snatching up about 85 pct of capacitor output, this minute marvel has had little opportunity to develop its full civilian market potential. The same holds for export.

NATO nations get some capacitor output through government channels, but it's clear that the export market hasn't been scratched. A 330 pct increase in capacitor demand by 1961 can be regarded as a conservative estimate.

Who Makes Them? — Some of the major capacitor producers are Fansteel Metallurgical Corp., General Electric, P. R. Mallory, Ohmite, and Cornell-Bubilier. The secret of the capacitor lies in tantalum; powder, foil, or wire. Fansteel is the major U. S. tantalum producer, but Union Carbide and a chemical producer are reportedly eyeing this red hot market.

Delivery of transistors is easier, but only because there is considerably more productive capacity.

Pay Is Good for Top Steel Men

Survey Shows Steel Executives Lead the Pack

McKinsey report says top executive of a steel company gets better pay, benefits than average of all industries.

Key reasons: Steel's bigness, and position as showcase of American industry.

▪ Steel is staying ahead of the all-industries pace in top executive pay. But the universal problem of getting and holding good men is narrowing the gap.

This is evident from a study by McKinsey & Co., New York, management consultants, based on Securities and Exchange Commission reports by 641 companies listed on the New York Stock Exchange — about half of the Big Board's listing. The 641 represent 18 different industries. Steel data was taken from a representative 23 companies in the basic iron and steel business.

Top Men Make More — Chief steel executives, the study finds, enjoyed an average pay increase of 9 pct in 1956. The number of increases topped decreases by 5 to 1.

In industry generally, 48 pct of chief executives received higher compensation. Of the 18 industries analyzed, only one had a higher average increase — nonferrous metals, with a 9.1 pct rise.

1955 Pays Off — The McKinsey Report suggests steel's good showing may be partially attributed to the industry's 1955 performance, evident early in 1956. In 1955 steel led all industries studied in percentage increases in both sales and profits, while in 1956, steel's sales and profit improvement was below the all-industries average.

John B. Merrell of McKinsey points out that, by a statistical quirk, steel's position is better than it appears. If chief executive compensation is plotted against company net profits, and the sample data projected, for both all-industries and steel, to cover a wide profit range, the steel curve dips under the all-industries curve at the lower end (see chart—dots are steel company heads). However, the points plotted from actual steel data, not projections, are substantially above all-industries for most of the range.

Fringes on Top—Steel is ahead of the average in executive fringe benefits as well. The industry continues to emphasize deferred compensation, with 33 pct of the steel companies having such plans for chief executives. All-industries average is only 26 pct. Industry in general is gaining more rapidly in deferred compensation than steel. The 18-industry average is up 9 pct from 1955, while steel rose only 6 pct.

Similarly, steel is among the leaders in providing stock options. Option plans in the steel industry were available in 71 pct of the cases in 1956, compared to an average of 55 pct for all companies.

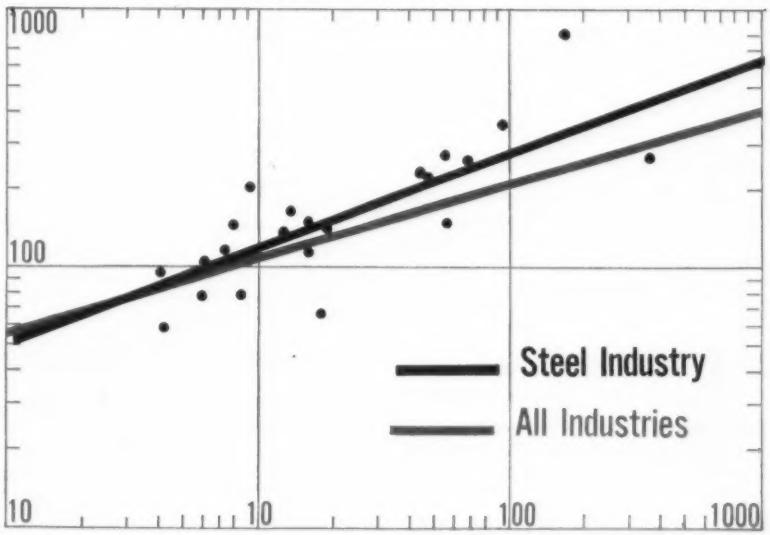
Less for Second and Third—The differential between the top man's pay and that of second, and third in command tends to be a little wider for steel than for industry generally. The second highest paid man in steel reads a paycheck 67 pct that of the No. 1 man. Industry average is 70 pct. No. 3 on the steel totem pole gets 56 pct of the boss's pay; industry-wide 57 pct.

Why is steel running ahead of the average? Mr. Merrell suggest because all steel is big industry. Even a "small" steel mill is a big plant. Capital investment is large, and technical knowledge of executives must be extensive.

Finally, there is perhaps a strong psychological factor. Steel, by its size and indispensable nature, is the showcase of American industry.

How Steel Chief Executives Rate

Compensation (Thousands of Dollars)



Net Profits (in Millions of Dollars)

How to Pick That Second Man

There Are Eight Traits to Look For

Improper choice of a second-in-command can affect business efficiency and worker morale.

It's best to go slow and look for prospects who display the needed qualities of leadership. —By Alfred M. Cooper.*

▪ Few decisions for the businessman are more important than selecting and training a subordinate to take charge of a department or division in the headman's absence.

If too little thought is given to picking this understudy the results can be serious. If the boss is absent and his replacement inadequate, business may suffer and worker morale may sag. And don't forget the second man will take over the job permanently if the boss is promoted. This makes selection of the right man as assistant a must.

Executives agree that the boss should decide in advance what qualities he wants the second man to possess, and then look for an assistant who already has most of these qualities.

The Big Eight — Although as many as 40 characteristics may be considered, executives believe there are eight minimum qualities of leadership which should be possessed by the second man. These essential traits are: Intelligence, integrity, forcefulness, fairness, loyalty, kindness, knowledge of work, and health.

Executives define these qualifications about as follows:

Intelligence may be readily evaluated by means of an IQ test, and there's no doubt a second man should rate highly in this respect. The work force likes to report to a man who is smart. However, there are many extremely intelligent men and women who lack other qualities. Sometimes a superior may be too smart for his own good—scintillatingly intelligent—but otherwise a thoroughly unpleasant individual.

For example, the intelligent man may be deficient in **integrity.** While it's difficult to measure this leadership quality, it's important to determine which prospective second man has the courage, the steadfastness and the desire to do the right thing.

Forcefulness is another excellent asset for the second man to possess —provided it doesn't verge on hard-boiledness. When the assistant is in charge he must be able to issue orders so they will be obeyed without question.

Fairness, as a quality of leadership, can only be determined in a potential assistant by watching his dealings with subordinates.

Loyalty to company, boss and subordinates is another essential trait. Unless this quality is present the assistant may actually double-cross his own superior

Kindness—its presence or lack—can be observed before an assistant is confirmed in his new job. A supervisor should be forceful, yet kind. He should be strictly fair and impartial, but temper his judicial fair-dealing with a friendly attitude.

Knowledge of work is usually taken for granted, providing the second man has been employed in the division for several years. However, in some cases this knowledge may at first be lopsided.

Health cannot be overrated, especially if the second man must be depended on for long hours of effort in periods of emergency.

* Alfred M. Cooper, a well-known industrial training consultant and writer, is the author of many books and articles on training supervision.

While the Boss Is Away—

▪ It is frequently contended that the shortcomings of a second man may show up only in the absence of his superior. A man who makes a good assistant while the head man is on the job may be a different man when he has no one around to advise him.

At these times, the assistant may commit a series of supervisory crimes that can come close to wrecking organization morale.

He may play favorites with employees he likes and get unnecessarily tough with others.

He may take advantage of the boss' absence to try out a few of his own ideas—ideas never tested, and which the boss could have told him wouldn't work at all.

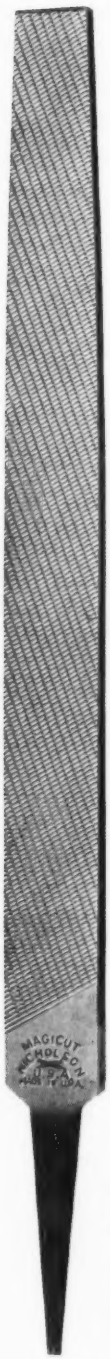
Or he may be a weak sister, over-conciliatory with all subordinates, currying favor with everybody—and gaining contempt of all.

He may use the boss' absence to get even with employees he has disliked.

He may develop a streak of self-importance not in evidence until he is on his own.

Worst of all, the No. 2 man may want to become the No. 1 man and make an effort to undercut his boss' authority and prestige.

THE MOST EXCITING FILE NEWS IN YEARS!



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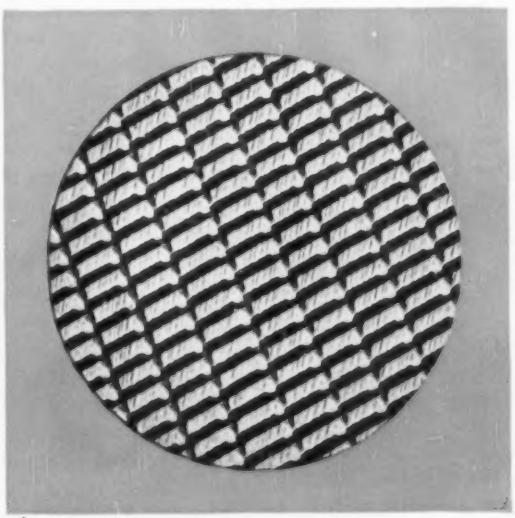

⬆ This is a close-up (enlarged) of the most efficient All-Purpose Machinist's file you can use. It's available *now* through your Industrial Distributor.

⬅ Note the unique pattern of narrow chip breakers created by steep-angled serrations. This *maximum* cutting surface design gives fast, deep penetration on all metals.

When it comes to file news, it's Nicholson that makes it! The news now is the Magicut—a great new Machinist's file.

The All-Purpose Magicut has a new kind of teeth—Penetrating Planer Type—to rough and smooth all industrial metals in one operation. This new tooth structure, created by Nicholson research, is *super*-efficient.

You'll like the exceptional versatility of the Magicut. You can use it on dense metals like brass and bronze . . . on other metals like annealed tool steel and malleable iron. The Magicut is an All-Purpose Machinist's file for everything from soft aluminum and lead to stainless steel. It comes in Flat, Half Round and Square shapes in 8-, 10-, 12- and 14-inch lengths.

Created by Nicholson researchers, made by Nicholson craftsmen, sold in Nicholson or Black Diamond brands, the Magicut is the most exciting file news in years!

In keeping with his policy of bringing you the newest and finest in equipment and tools, your Industrial Distributor now has the new Magicut file. Ask his representative to show it to you.

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NICHOLSON and BLACK DIAMOND FILES

A FILE FOR EVERY PURPOSE

Shipments Head Up . . .

BY CHOPPER: Helicopters handle emergency orders from the roof of Westinghouse's East Pittsburgh plant. Long distance orders go to the airport for further shipping, short hauls go directly to the buyer.

Reach Agreement On SUB Payments

Union, management agree on plans to get both SUB and state unemployment benefits in Ohio and N. Carolina.

Ohio slated for court test. Workers in N. Carolina will get SUB when they return to work.

▪ Steel management and United Steel Workers agree on an approach to supplemental unemployment benefits in Ohio and North Carolina. They are unable to agree on payment methods for Indiana and Virginia. Proposals for latter will go to a board of impartial arbitrators on Sept. 9.

By laws or rulings, these four states blocked the operation of automotive SUB plans. In effect they say laid-off workers will not receive full state unemployment benefits for weeks in which they draw SUB.

Payment Begun—The payment period for steel SUB began Sept. 1, when company financed funds reached $70 million. In Ohio, about 114,000 steelworkers are covered. The plan is to make standard SUB payments, concurrent with state benefits, and test in court the legality of an administrative ruling to reduce state aid.

The law in Ohio does not specifically cover steel SUB, and steel men feel they can secure judicial blessing for the plan. Thirty-eight states, many with laws similar to Ohio's, have approved SUB.

Pay Later—In North Carolina, the union and company management have agreed to pay SUB in a lump sum when the laid-off worker is recalled to his job. The worker will draw, unchallenged full state benefits.

Indiana and Virginia have passed laws specifically forbidding integration of SUB and state benefits. SUB is not outlawed. A laid-off worker can not be paid state compensation at the same time as SUB. In Indiana, 69,000 steelworkers are covered by SUB.

Court Test — It's now unlikely that the Ohio unemployment fund administrator will permit state payments to go ahead on even a protest basis. In that case, the issue will hinge on one or two test cases that will be pushed.

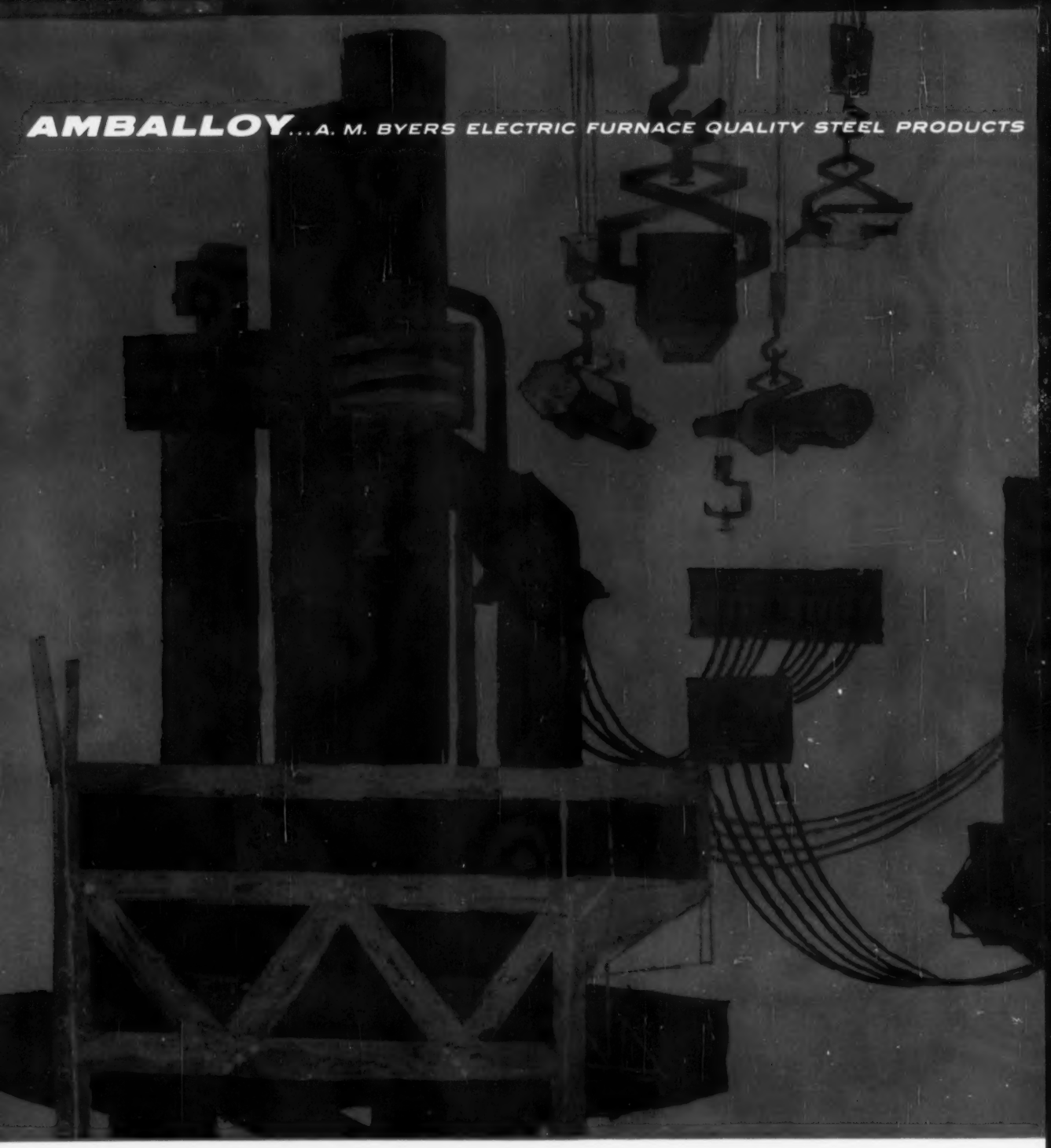
Kefauver Sounds Off

Sen. Estes Kefauver (D., Tenn.), is again criticizing U. S. Steel Corp., and the steel industry in general, for raising prices allegedly more than was justified by wage increases.

In a "limited summary of the progress" his Senate Antitrust Subcommittee made while taking testimony from U. S. Steel and the United Steel Workers union, the Senator contends there is a "substantial gap between the $6 price increase and the amount by which (U. S. Steel's) prices were increased"; that the Corporation has refused to provide unit cost figures, and that steel prices within about a year were raised by a total of $19.50 a ton, which will cost consumers $1.6 billion a year.

He also questions whether competition in the steel industry is "sufficiently effective" to protect the public, and implies collusion among steel producers because prices of the major firms are about the same.

The Subcommittee is in recess until early October, when Bethlehem Steel Co. will be called to testify. A number of farm machinery producers will follow the steel industry.



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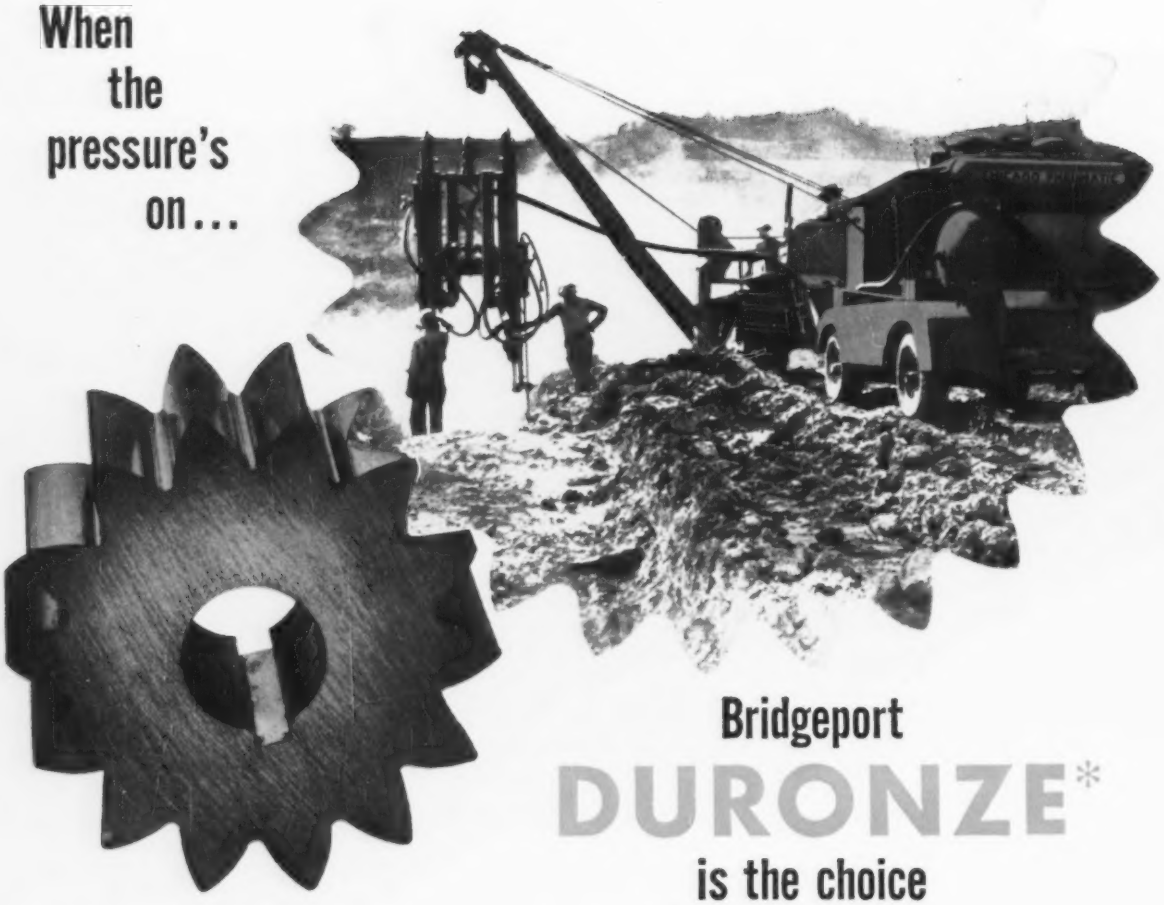

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*Aluminum Silicon Bronze

Superior wear resistance and good machinability make Bridgeport Duronze 707 (Aluminum Silicon Bronze) an ideal material for many products.

Take, for example, its use by Chicago Pneumatic Tool Co., New York, N. Y., in the oil pump gears used in their rotary portable and stationary Class "P" compressors.

These gears pump the lubricating oil which seals rotary compressor vane clearances, lubricates vital parts and also cools the air during compression. In meeting the precise requirements of this job, Duronze's combination of high strength, wear resistance and machinability are equally important advantages.

In the annealed condition, in which it is generally supplied, Duronze has an average tensile strength of 90,000 lbs. per square inch. Its endurance limit is over twice that of Naval Brass and it is generally superior in corrosion and wear resistance.

Duronze is only one of Bridgeport's complete line of copper and brass alloys in sheet, rod, wire and tube, designed to help you meet a wide variety of product and production applications better, faster and more economically. To help you in choosing the right alloy for your specific needs, you can expect and get experienced assistance from your Bridgeport Salesman and from the Technical Staff behind him. For prompt service, give your local Bridgeport Sales Office a call today.

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John W. Douglas

A Balm for Small Businessmen

High taxes, low tariffs, says Mr. Douglas, must be revised to give the little firm a break.

As a WPB official during World War II, he learned how Washington operates.

Now in business for himself, his government background adds authority to his comments.

JOHN W. DOUGLAS: An overhaul of tax laws is overdue.

▪ Almost everybody has something to say about taxes. A few have opinions on tariffs. But to John W. Douglas, taxes and tariffs merit much more than opinions. With him they are a business philosophy —especially where small business is concerned. Government operated levies, if mismanaged, can spell disaster to small business, he warns.

You may already have guessed that Mr. Douglas is a small businessman. His company, Republic Foil and Metal Mills, Inc., is one of the more prosperous of the young industries born after World War II.

Cites Abuses—It's not that he believes small business is a privileged group that deserves special favors. "Basically, small business must stand on its own feet," he says. "Companies which are under-capitalized, lack sound management experience and engineering ability, or enter a marginal field of endeavor should not look to the government for special favor."

Yet under current laws, excessive taxation can become a prime weapon of destruction to the little company, continues Mr. Douglas. As for tariffs, he submits that they have become an international bargaining medium which make pawns of domestic industry. There are many instances where foreign governments subsidize their exports, allowing undercutting of prices in the U. S. Meanwhile, imports from the U. S. are barred.

It might be noted here that Mr. Douglas' views have been entered in the Congressional Record by Sen. Barry Goldwater.

He Knows Washington—A Yale man whose college days ambition was to "retire 10 years after graduation," he admits to have fallen somewhat short of his goal. Unfortunately, perhaps, he was graduated in an ominous year—1929. His retirement plans suffered several setbacks.

During World War II he served in the U. S. Office for Production Management, as Chief of the War Production Board's Brass Mill Div. and as assistant director of the Copper Div. Starting on a shoestring in 1946, he organized Republic Foil and built it into a 155-employee company with assets over $2 million. It accounts for about 5 pct of total aluminum foil output in the U. S.

As president and board chairman of Republic Foil, Mr. Douglas puts in a busy day. Yet he also serves as a director of the Aluminum Assn., and is a member of a BDSA advisory committee.

from: Metal & Thermit to: The IDEA Minded

New type chromium plate solves corrosion problems

Hydraulic piston rods plated with Unichrome Crack-Free Chromium by Bendix Products Division for their popular power steering mechanisms are helping to make driving safer and easier than ever. This innovation by Bendix provides increased protection against wear, corrosion, and hydraulic leaks.

Compared to ordinary chromium, Unichrome Crack-Free Chromium, developed by Metal & Thermit, stands out on resistance to corrosion, thermal shock, wear, and prevention of hydraulic fluid loss.

Costs little to brighten up sales

Given a choice, the customer always picks the brighter product. That's one good reason to consider two newly developed Unichrome Dips that produce bright chrome-like finishes on zinc plated or galvanized products. Extreme economy is another. Costs for these dip compounds range between 30¢ and 60¢ per 1000 sq. ft. of surface treated. They're increasing shelf life and sales appeal of even the most competitively priced products . . . such as toy wheels, electrical conduit and boxes, and rough hardware.

Tank car turnaround costs less

"Very good", reported the inspector at a large chemical company. He was examining the interior of one of their tank cars coated with Unichrome Lining B-124. Twenty-two trips in contact with highly corrosive 92% phenol left little mark on the protective coating.

Companies using tank cars or tanks can benefit from this experience. With skilled firms in key locations now available to apply linings to open or closed tanks, no company has to forego the maintenance-saving, cost-cutting protection of enduring Unichrome Tank and Drum Linings.

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Is Capital Goods Boom Easing?

You don't have to be an economist to spot some signs of a possible weakening in capital goods spending.

Many major industries are rounding out their expansion and modernization programs. It's something to watch in the months ahead.

▪ At the introduction of Ford Motor Co.'s new Edsel, last week, Ernest R. Breech, Ford chairman, disclosed that the No. 2 auto producer has nearly completed its principal modernization program.

In itself, this has considerable significance. Since World War II, Ford has poured billions of dollars into its expansion and modernization program. As one company, this program has contributed importantly to the capital goods boom of recent years.

Others Too—You don't have to be reminded that the capital goods spending program of industry has been the single important factor in sustaining the high level of business activity since 1955. Even self-assured automakers had to concede that 1956 was the first modern business boom that wasn't accompanied, or led, by an upsurge in automotive business.

Not only Ford, but General Motors to a greater and Chrysler to a somewhat lesser extent have been major contributors to this capital goods boom. The point is that Ford is probably not alone in rounding out its expansion.

Few Billions Left — And it's going deeper than the auto industry. Major expansion programs involving hundreds of millions of dollars just aren't announced today.

This is an involved way of raising the question: Is the capital goods boom on its way out?

. . . Not Yet, but Watch the Trends

Some Indicators—There are any number of indicators pointing to a decline in capital goods spending.

Machine tool orders are lagging behind shipments. Bookings of fabricated structural steel are down. Some types of heavy industrial equipment, such as presses, are already feeling the pinch, to name a few.

Backlogs Still Exist—You can't be too alarmed while backlogs in some of these industries stretch to many months. Nor is it too alarming when you observe the so-called downtrend is only a decline in the rate of increase, the situation in some areas of business.

There are other encouraging factors. Remember, the tight money policies are the result of an excess demand for capital improvements money. There is still no indication this is a false demand. When money is available, there should be a new surge of capital goods spending.

Meanwhile, there is still the moderate, disturbing trend away from spending on durable consumers' goods. For the second year, 1957 auto sales will be comparatively slow. There is little hope of a terrifically better rate in 1958.

Work To Be Done—With the auto industry and appliance industry now having larger capacity than current demand would indicate, there is little incentive to build.

However, new tooling programs, modernization of present facilities, and the inability of industry to stand still in an expanding economy indicate a real "bust" is unlikely in capital goods. Meanwhile, keep an eye on the trends.

Pay Boosts Keep Earnings Up

Income Up—Although the consumer tends to spend a little less on goods and more on services, there's little wrong with his overall earning position.

Personal income in July was at an annual rate of $345.5 billion, according to the Office of Business Economics, Dept. of Commerce. This is almost $1 billion higher than in June, and $20 billion, or six pct, over July, 1956.

But Manufacturing Lags — July increases were the result of wage raises in industry. Salaries are running ahead of last year in all major industrial divisions.

Total wages in manufacturing, however, have shown little change from December. Declines in employment and shorter work weeks in some industries apparently wiped out the effect of higher wages on total manufacturing pay.

AUTOMOTIVE

Unsafe Cars Are Growing Menace

Lack of Maintenance Boosts Accident Rate

Automakers are working to make cars safer in the event of an accident.

But the big problem is educating car owners to keep safety devices in repair.

One out of five vehicles is found faulty.—By H. R. Neal.

▪ There is more to automotive highway safety than seatbelts and speed limits. A recent, unheralded report contains a clue to a possible major factor in the high death toll collected on the country's highways and byways.

The Inter-Industry Highway Safety Committee has issued the results of its annual National Vehicle Safety-Check Program for 1957. This year's check uncovered a bumper-to-bumper crop of unsafe cars.

Twenty Pct Fail — Some 1300 communities across the country cooperated in the safety committee's program. They sponsored safety-check lanes where motorists could take their vehicles for a free going-over to uncover faulty safety equipment.

More than 2,600,000 cars and trucks rolled up to the community lanes and were subjected to careful scrutiny by squads of trained searchers. The result: an astounding 20 pct of them were found lacking in some element of their basic safety equipment. Ten items were covered in the free checks.

Areas of Neglect—For the third consecutive year, rear lights led the list of items found most frequently in need of immediate repair. Nearly 28 pct of the trucks checked flunked the test. For cars and trucks combined it was 24 pct. A check of almost any police department accident files will show there are more rear-end than head-on collisions.

Faulty brakes were second on the list with more than 19 pct of the vehicles tested being on the short side of adequate. Front lights were close runners with some 17 pct of the cars and trucks found to have inadequate headlights.

Other Dangers—Unquestionably, these three items are the most important safety items on a car today. More accidents occur at night than in daylight hours. The conclusions are obvious — a good many drivers are openly courting danger.

Exhaust systems and tires were next in faulty frequency of 10.4 and 8 pct respectively. Scaling downward from the leaders were steering, windshield wipers, glass, horn and rear-view mirror, ranging from 6.7 to a mere 1.5 pct.

Today only 14 states and the District of Columbia require periodic motor vehicle inspections. Only voluntary inspections are covered in the report. At most, only one of every three cars has received a safe operation check in the past year.

Congress Shows Concern — It should be safe to assume that vehicles most in need of repairs were never taken within a bad brake slide of any safety check, except in the states which require it.

Of late, U. S. Congressional subcommittees have shown genuine concern over the problem of automotive safety. Leading automotive producers are at work developing means of making their products safer in the event of an accident.

But the really big problem is:

General Motors to Sell Opel in U. S.

CARAVAN FROM GERMANY: The 1958 Opel Caravan is a German-made, two-door station wagon to be introduced in the U. S. this November by General Motors. Buick dealers will handle distribution, with initial allotments limited to the East and West Coasts. The German car has a four-cylinder, 45-hp engine, with a compression ratio of 6.9 to 1. It weighs 2160 lb, and is 62 in. high. An overhead luggage rack will be standard equipment. Price has not yet been determined, says GM.

INCREASED DEMANDS

of AUTOMOTIVE INDUSTRY...

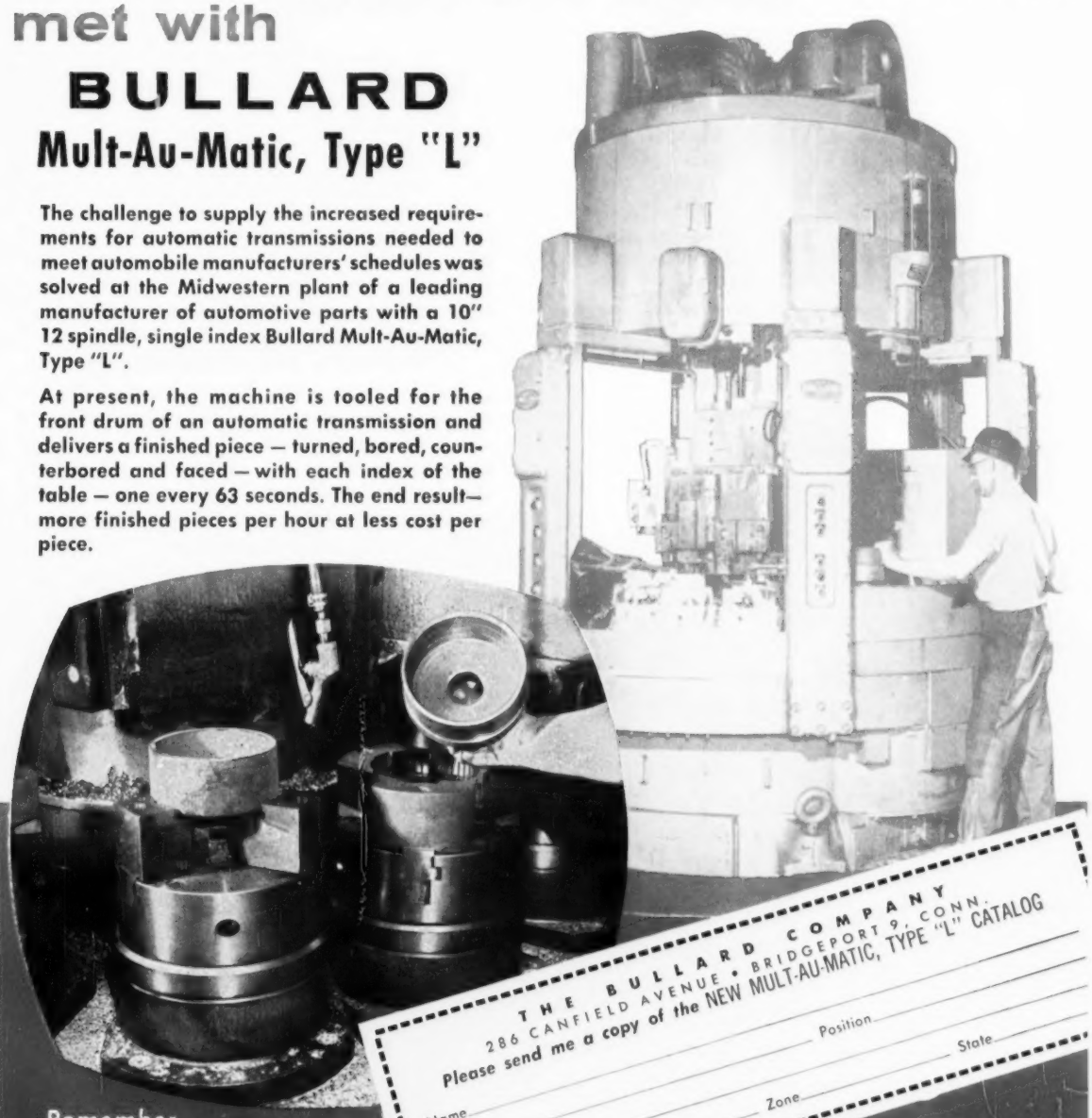
met with

BULLARD

Mult-Au-Matic, Type "L"

The challenge to supply the increased requirements for automatic transmissions needed to meet automobile manufacturers' schedules was solved at the Midwestern plant of a leading manufacturer of automotive parts with a 10" 12 spindle, single index Bullard Mult-Au-Matic, Type "L".

At present, the machine is tooled for the front drum of an automatic transmission and delivers a finished piece — turned, bored, counterbored and faced — with each index of the table — one every 63 seconds. The end result— more finished pieces per hour at less cost per piece.



THE BULLARD COMPANY
286 CANFIELD AVENUE • BRIDGEPORT 9, CONN.
Please send me a copy of the NEW MULT-AU-MATIC, TYPE "L" CATALOG

Name _____ Position _____
Company _____ State _____
Address _____ Zone _____
City _____

Remember to cut costs when cutting metal — buy BULLARD

Call your nearest Bullard Sales Engineer — he'll show you how.

THE BULLARD COMPANY BRIDGEPORT 9, CONNECTICUT

HEAVY EXTRUDED SHAPE

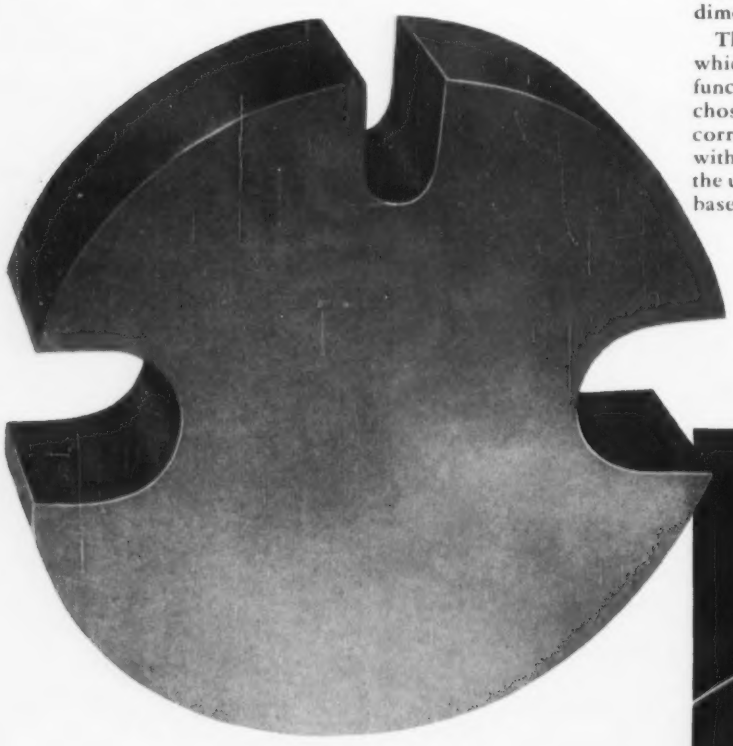
Saves Over 25¢ per lb.

FOR THE STRONG ELECTRIC CORP.

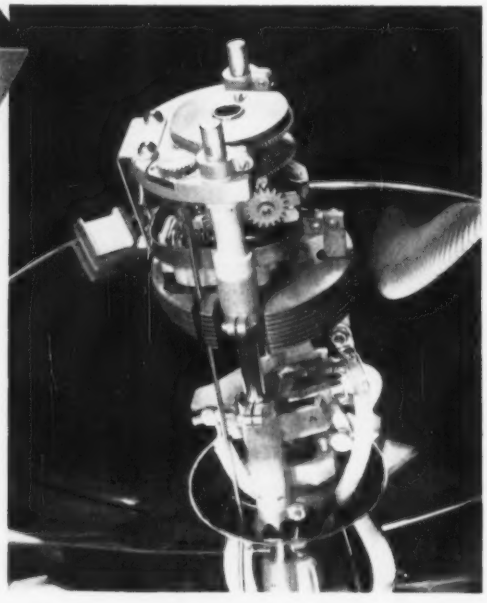
The unusual thing about this copper extruded shape is that it saves money in first cost as well as in machining time. The double economy amounts to over 25¢ per pound. The large illustration shows the shape as supplied in the form of a slug or pre-formed disc, 1 3/16" x 5". This begins as a long extrusion, from which Revere cuts the discs, and pickles them before shipping.

The customer is The Strong Electric Corp., Toledo 2, Ohio, which originally tried plate and bar, but found costs were too high. Revere Product Engineers, Methods and Production Departments collaborated with the company on the problem, and were able to develop the unusually heavy and economical shape. Strong reports a number of savings. One is that the shape is machined quickly and perfectly, with almost no rejects. This is due to the denseness and uniformity of the metal, a result of the high pressures exerted during extrusion. (Finishing operations include drilling bolt holes and cutting cooling fins.) As a secondary result of improved machining, the customer does not have to keep large inventories of metal to take care of spoilage, nor handle large quantities of scrap. Further, Revere supplies the discs in the correct thickness, eliminating a cutting-off operation for Strong. Incidentally, we are glad to supply shapes cut to dimensions, or in long lengths, as desired.

The completed part is an obturator-probe, which fulfills a control and heat dissipation function in a powerful searchlight. Copper was chosen for its ability to conduct heat and resist corrosion. Revere will be glad to collaborate with you in your search for economies through the use of extruded shapes in copper and copper-base alloys, and aluminum alloys.



Copper Extruded Shape, 1 3/16" x 5", as furnished.



Shape in place in a carbon arc searchlight mechanism.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

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Mills: Baltimore, Md.; Brooklyn, N. Y.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Newport, Ark.; Rome, N. Y. Sales Offices in Principal Cities, Distributors Everywhere.

Automotive Production

WEEK ENDING		CARS	TRUCKS
Aug. 31,	1957*	117,324	21,043
Aug. 24,	1957	123,130	20,531
Sept. 1,	1956	58,166	18,705
Aug. 25,	1956	69,676	18,644
TO DATE	1957	4,390,924	755,543
TO DATE	1956	4,043,166	771,708

*Preliminary. Source: Ward's Reports

"How do you make the man behind the wheel keep up the safety devices that came with the vehicle initially?"

Who Will Edsel's Customers Be?

Ford has set a tentative goal of 200,000 unit sales for the Edsel's first model year. This is about 3.3 pct of a 6 million car year. The big question is "Who is going to lose the business to Edsel?"

In the medium price range where Edsel is competing, there now are 11 makes of cars. Edsel is seeking about 25 pct of this market. Ford hopes business will come from its competitors—General Motors and Chrysler.

Mercury's Outlook—But a majority of automotive writers who attended the Edsel preview were of the opinion Edsel would take its biggest bite out of Mercury sales.

Ernest R. Breech, chairman of the board of Ford Motor Co., was asked: "What effect do you think introduction of the Edsel will have on the volume of Ford and Mercury sales?"

He answered: "I think until the full product line and product plans of Ford Motor Co. for 1958 are evaluated, it is a very difficult question to answer. . . . If Edsel got two pct of the market, for example, we would not expect that two pct to come out of Mercury sales. We have planned for both Mercury and Edsel, of course."

Upgrading Is Key—What Mr. Breech means is Mercury dealers can expect to lose some business to Edsel, but Ford Motor Co. expects to hold on to more of its customers by giving them a choice of cars when they upgrade. Ford is also not against Edsel's taking customers away from GM and Chrysler.

Model Sewage Plant

Pontiac Div. of General Motors has licked a problem that is common to many manufacturers today: Inadequate waste treatment due to plant expansion.

Pontiac's treatment facilities formerly were located in the division's numerous plants. They could dump directly into sewers. They were not under centralized control. While dangers from the sewage were remote, accidents did happen.

Management Acts—On two occasions, chromium wastes were accidentally dumped into a nearby river, contaminating the water supplies of several downstream communities. The main Pontiac plant was faced with the threat of having its sewage outlets cut off. Management set out to re-do its entire system.

Today, the plant has a giant industrial waste treatment system capable of neutralizing 1500 gal of noxious waste solution each minute. It consists of an operations and laboratory building along with 34 treating tanks.

Tanks have individual capacities up to 500,000 gal. The entire system is based on the ability to treat contents of one holding tank in 16 hours.

Speed Control

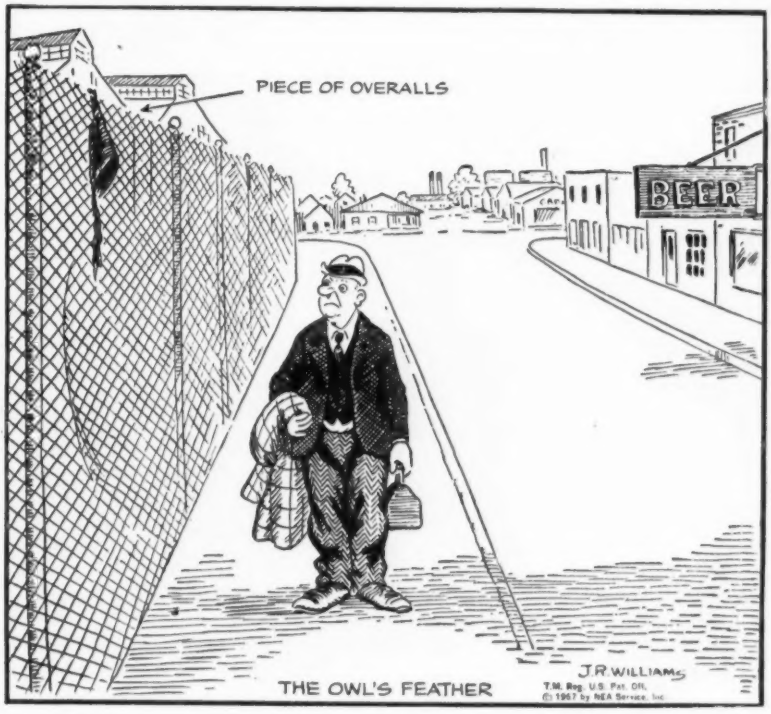
Automatic speed control for autos, gone since the days of the auxiliary hand throttle, is due for a comeback.

Perfect Circle Corp., Hagerstown, Ind., is tooling up for volume production of such a device.

Select Your Speed—Several automakers will offer the "Speedostat" as optional equipment on 1958 models.

A dial on the dashboard or steering column lets the driver select any maximum speed he desires. When the car reaches that speed, a backpressure develops under the gas pedal.

THE BULL OF THE WOODS By J. R. Williams



Cincinnati Filmatic No. 3's

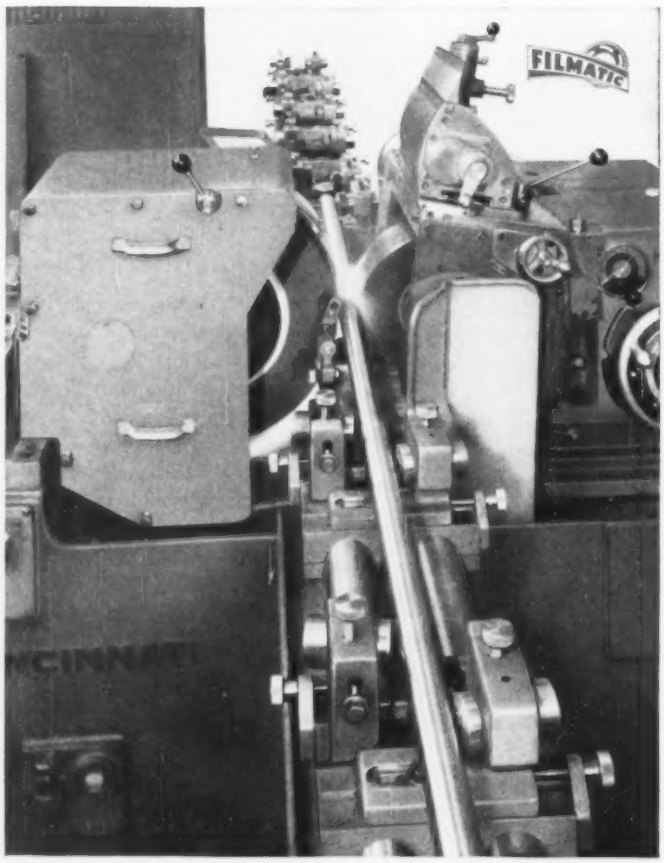
Make Your Tough Centerless Grinding Jobs Look Easy and Cost Less

Thrufeed grinding 4" steel bars, or infeed grinding multiple diameter spindles up to 20" long are tough jobs for any centerless. CINCINNATI® FILMATIC No. 3's make these jobs, and thousands of in-between sizes and shapes, look easy and cost less. The No. 3's are extra powerful to give you extra productive capacity combined with Cincinnati's well-known dependability of performance. Contributing factors to these desirable elements of low production costs include:

1) **Fixed bedrock mounting of the grinding wheel spindle for fast, economical grinding**
2) **FILMATIC grinding wheel spindle bearings for highest quality performance and zero maintenance. They're self-adjusting for every job**
3) **Pre-loaded, precision anti-friction regulating wheel slide, for super-precise size control**
4) **Infinitely variable regulating wheel speeds ranging from 10 to 320 rpm, for quick selection of the correct speed**
5) **Automatic grinding wheel balancing (supplied at extra cost)**

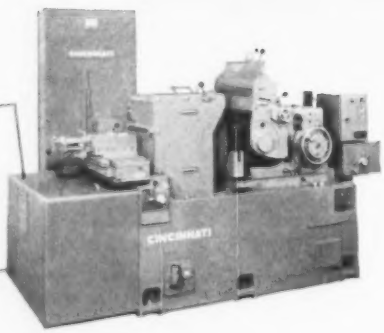
Eleven additional features and their relation to the proved dependability and productive capacity of CINCINNATI FILMATIC No. 3 Centerless Grinders are outlined in catalog No. G-664-1. Ask for a copy today. You will find brief data in Sweet's Machine Tool File.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO



Solid steel bars, up to 4" diameter x 18 feet long, are ground on a CINCINNATI FILMATIC No. 3 Centerless Grinding Machine equipped with Type D Long Bar Grinding Attachment.

CINCINNATI FILMATIC No. 3
Centerless Grinding Machine
Catalog No. G-664-1



CINCINNATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • ROLL GRINDING MACHINES • SURFACE GRINDING MACHINES • CHUCKING GRINDERS
MICRO-CENTRIC GRINDING MACHINES • CENTERLESS LAPPING MACHINES

Ike Asks for Law Change

"Conflict of Interest" Antiquated, He Says

President tells Congress that under the current version it's tough to get the best men into the government.

Personal sacrifice required is too much.

Congressman says he will push for a more "realistic law" next year.—By G. H. Baker.

▪ Congress has been asked to make it easier for top executives to accept government positions.

Under the present "conflict of interest" law, the government is finding it increasingly difficult to get the best men to make the personal sacrifices required to serve their government even for limited periods.

Good Men Hard to Get—President Eisenhower recently spoke with some feeling on this subject. He pointed out some of the headaches his Administration has had in trying to get the best men in industry, in labor, and in business to serve in government posts.

Accepting a high-ranking job in Washington now means working for a lower salary, uprooting the family and moving to Washington, being a target for the abuse of politicians, making public all details of personal investments, and often returning to find yourself out of touch.

Not Worth It—Is it worth it? Hundreds of competent business executives every year who send a polite "no" to a White House invitation to accept a responsible position, don't think so.

Here's what Ike says:

"You have this 'conflict of interest' law which I have heard many congressmen and many senators say is really antiquated and out of date. But it reaches into such details of a man's life and business that if you want to get a younger, effective executive from out of business to do one of the jobs here, you are practically ruining his business career and his future. I would like Congress to look it all over."

Congressional Support — In the House, Rep. Kenneth Keating (R., N. Y.) says there's no chance Congress will rewrite the "conflict of interest" law this year, but he plans to push for realistic law next year.

Air Force Recoups

Air Force spending is not being cut back nearly as severely as was first announced. Skillful lobbying by Air Force generals has resulted in cancellation of some planned reductions, plus easing off of other cutback schedules.

For example, the Air Force has succeeded in having about 25 pct of a planned $1.25 billion cut restored by the Office of the Secretary of Defense. About $300 million is put back in the Air Force spending picture. Nearly all of this is being earmarked for missiles and missile development.

At Army Expense—This restored $300 million is chiefly at the expense of the Army. Army generals take a dim view of this kind of fund transfer, but there's little they can do about it. As a result, the Air Force is on an annual spending rate of $17.9 billion.

Seaway Toll Starts Fight

Battle in Washington — Before the growing St. Lawrence Seaway is opened to deep-draft ships, it may be put under close scrutiny by Congress.

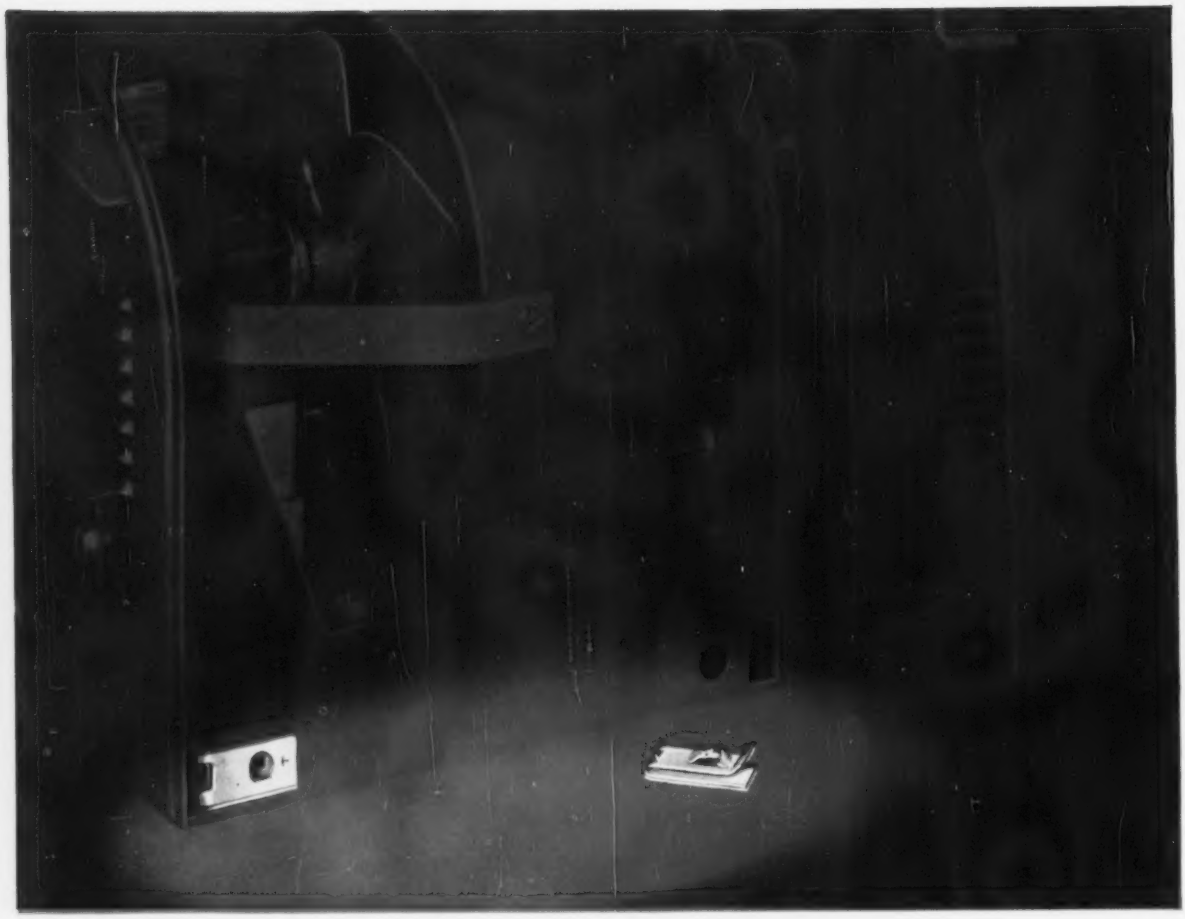
Rep. Saylor (R., Pa.) calls for a reappraisal of the entire project before the Seaway Development Corp. is allowed to make use of its full authorization, now $140 million. At the same time, a newly-formed group is warning against setting less than compensatory Seaway toll rates.

Seaports Say—Token toll rates, or toll-free traffic, may be sought by Great Lakes shippers, according to the National Committee for a Non-subsidized Seaway. This group represents chiefly Atlantic and Gulf Coast business and ports interests. Its temporary chairman is Rep. Fallon (D., Md.).

The committee issues its warning as the Seaway Development Corp. prepares to hold conferences with potential shippers to work out toll policies. Public hearings on actual rates are promised.

Inland Opinions—Opposition by the committee is stirring up indignant comment among midwestern congressmen. Rep. Blatnik (D., Minn.) accuses the group of trying to wreck the new waterway project. Sen. Potter (R., Mich.) charges the committee with attempting to force tolls high to discourage extensive Seaway use.

However, the congressmen do not predict formation of a new group to battle the committee.



4-star feature with Drive-in Movies...

SPEED NUTS® simplify heater maintenance

Right from the start, the Electromode Division of Commercial Controls Corporation, Rochester, designed Tinnerman SPEED NUTS into their new electric car heaters for drive-in theaters. SPEED NUTS provide efficient, economical attachments that simplify servicing and give Electromode a powerful sales advantage with theater owners.

Four "U" Type SPEED NUTS hold the weather-tight steel cover firmly in place. SPEED NUTS eliminate the need for welding, staking or tapping. Self-retained, they stay in position even when the cover is removed for inspection or servicing. They "float" in the panel to offset hole misalignment. And because of their unique design, SPEED NUTS never rust or freeze to screw threads even under prolonged outdoor exposure.

This is a prime example of the advantages gained by designing with SPEED NUT Brand Fasteners in mind. Peak fastening efficiency is built in—no need to invest in high-cost tooling at the start, or to make revisions to cut costs later. Call in your Tinnerman representative now to discuss your new design projects. He can help you save time and money without sacrificing product quality. His office is listed in most major telephone directories. Or write to:

TINNERMAN PRODUCTS, INC.
P. O. Box 6688 • Dept. 12 • Cleveland 1, Ohio

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Speed Nuts®

FASTEST THING IN FASTENINGS®

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario. GREAT BRITAIN: Simmonds Aerocessories Ltd., Treforest, Wales. FRANCE: Simmonds S. A., 3 rue Salomon de Rothschild, Suresnes (Seine). GERMANY: Mecano-Bundy GmbH, Heidelberg.

NEW LOOK: The JetStar, a 500 mph Lockheed utility plane gets cleaner lines by attaching two Bristol Orpheus engines in pods at the rear of the fuselage. It will fly at altitudes up to 40,000 ft.

Candidates for a Sales Call

New Additions to Your Prospect List

Marketers looking for Western sales can use this list of new and expanding industries.

It's latest rundown on customers for metalworking supplies and services.—By R. R. Kay.

▪ Business slow? Looking for new markets? The westward migration keeps rolling along at a record pace. And people make markets.

Not only California, but the whole Far West is in the act. Alert marketers can use this list of new and expanding industries. They're all good leads for tapping the Western market for machine tools, plating and handling equipment, and other metalworking supplies and services.

Electronics and Metals—Fenske, Fedrick and Miller, Inc., Los Angeles—makers of plating and test equipment. Badger Manufacturing Co., San Pedro, Calif. — water meters. Supergrate Open Steel Flooring Co., Maywood, Calif.—structural steel footwalks and stair treads.

AiResearch Manufacturing Co. Div. of The Garrett Corp.—just completed 40,000 sq ft expansion of its Phoenix, Ariz., electronic and valve making facilities.

Larco, Inc., Los Angeles—electric water coolers. Arnoux Corp., West Los Angeles—aircraft and missile instruments. E. F. Hauserman Co., Los Angeles—movable steel and aluminum partitions.

Machining and Extruding—Wesco Tool & Mfg., Burbank, Calif.—milling machines, coolant units. Screw Corp. of California, La Puente—fasteners. Western Extrusion Co., Gardena, Calif.—aluminum extrusions.

Western Copper Mills, Ltd., Annacis Island, B. C.—now underway on an $8.5 million copper mill. Canada Wire & Cable Co., Ltd., Annacis Island—$1 million wire and cable plant.

Otto Munson Co., Portland, Ore. —welding and machine shop. Tri-J Machine Shop, Pasadena, Calif.—machine shop. Collins Concrete & Steel Pipe Co., Portland, Ore.—steel fabricator. H. A. Seele Corp., Los Angeles—automatic screw machines.

Agricultural and Mining Machines—Litton Industries, Salt Lake City —new plant for electronic equipment. Peninsula Steel Products & Equipment Co., San Jose, Calif.—food processing, agricultural and mining machinery. Cole Manufacturing Co., Palo Alto, Calif.—O-rings and mechanical rubber products.

No matter how you say it . . .

*TRANSLATION: CUTTING OIL

The performance and the brand are the same around the world

Other Outstanding Shell Industrial Lubricants

Shell Tellus Oil—for closed hydraulic systems

Shell Alvania Grease—multi-purpose industrial lubricant

Shell Turbo Oil—for utility, industrial & marine turbines

Shell Rimula Oil—for heavy-duty diesel engines

Shell Talona R Oil 40—anti-wear crankcase oil for diesel locomotives

Shell Dromus Oils, a quality line of soluble cutting oils, permit higher speeds and greater feeds while extending tool life. They have excellent wetting and cooling properties and are not sticky or greasy.

Dromus* Oils have the added advantage of being easy to mix in hot or cold, hard or soft water. They form emulsions which remain stable in practically any concentration required in the shop.

Today Dromus Oils are available to your customers abroad. You can be sure that they will enjoy the same efficient performance your domestic customers rely upon.

• • •

For more information, write Shell Oil Company, 50 West 50th Street, New York 20, N. Y., or 100 Bush Street, San Francisco 6, California.

SHELL DROMUS OILS

SHELL

The Winner: Numerical Controls

It's Faster, by Test, Than Tracer Controls

Aircraft Industries Assn. tells how numerical trounces tracer controls in a machining contest.

Use of the new system is advancing rapidly.

But there are still problems before it can be universally used.—By E. J. Egan, Jr.

▪ Use of numerical controls on general purpose machine tools is advancing rapidly.

There are about 350 companies doing development work on numerical control systems and related data processing. But, at present, no one offers a complete three-part package: Numerical control system; data processing equipment; the machine tool itself.

Many Don't Know—This adds up to innumerable combinations, some in use and many more proposed for the future. On top of this, there's a widespread lack of knowledge, in many metalworking areas, as to just what numerical control is.

A detailed report issued by the Aircraft Industries Assn. ought to dispel a lot of fog. It should also clear away doubts whether numerical controls can guide cutting tools fast and accurately.

Machining Contest—For example, the report tells of a contest machining a typical part on both tracer controlled and numerically controlled equipment. The latter won hands down.

The machining groups assigned to the test had exactly the same start: A chunk of raw material and a standard AIA numerical drawing of the piece to be made.

Faster on Paper — After being handed the part print, both groups plunged into the manual paperwork that's a necessary preliminary to any fairly complex machining job. The numerical control team finished this in 66.6 pct less time. Next step, data processing for numerical control vs. template preparation for tracer control. The numbers boys did this job in 98.5 pct less time.

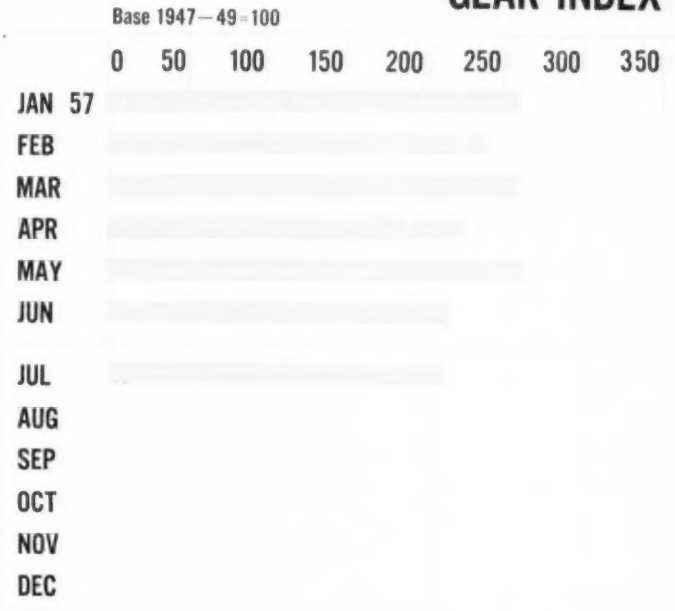
Actual machining by numerical control took 75 pct less time than tracer cutting. And a final boring job on the workpiece, which apparently had to be done manually by the tracer group, was finished in 80 pct less time by the numerically-guided cutting tool.

Long Way to Go—The test is indicative of what numerically-controlled machines are doing every day on many airframe production lines. But such equipment is far from being universally used. There are still many problems. The AIA tags management education as No. 1. This leads right to the next one: How to evaluate the best numerical control system for a particular plant.

Here are other problems most firms will face sooner or later: (1) How to actually set up to machine by numerical control; (2) What is needed for equipment maintenance?; (3) How can we be sure machines are responding properly to taped commands?

Getting the right answers isn't easy. But aircraft manufacturers, convinced that numerical control is necessary to their long range futures, are digging for them in earnest.

GEAR INDEX 1957



Source: American Gear Manufacturers Assn.

INDUSTRIAL BRIEFS

Helping Hand—A $2.3 million credit has been authorized to Acos Villares, S. A., of Sao Paulo, Brazil, to purchase foundry and forging equipment in the U. S. The firm is Brazil's leading producer of alloy and tool steels and the second largest Brazilian producer of steel castings and forgings. The machinery exported from the U. S. under the $2.3 million credit will assist the company in completing a $9 million expansion program.

Calling Engineers — Ohio State University is establishing an Air Reduction Fellowship in welding engineering. The fellowship will carry a stipend of $2400 a year for unmarried and $3000 yearly for married recipients. It has been made possible by a grant from the Air Reduction Co., Inc., New York, through the University development fund.

Down Under — The Timken Roller Bearing Co. will construct new bearing producing facilities at Ballarat, Victoria, Australia. Project will be underway by mid-September. Australian Timken Proprietary Ltd., will be the first company to produce tapered roller bearings in that country. In addition to Australia, markets are expected to be developed in New Zealand, Africa and Far Eastern countries.

Batteries Charged—The Electric Storage Battery Co. and Ray-O-Vac Co. have announced merger plans. Both companies agreed that business and assets of the two organizations should be combined. If effected, the basis for the combination will be the issuance of one share of Electric Storage Battery stock for each two shares of Ray-O-Vac. For 12 months ending June 30, 1957, Electric Storage Battery sales were $99.2 million; Ray-O-Vac, $40.2 million.

Latest Line—The Warren Corp., Pittsburgh, will open its new Lustra Line Div. plant at Clarion, Pa. on Sept. 15. Facility will fabricate stainless steel sinks, cabinets, fume hoods and technical apparatus for industrial research. Administration of the plant will be conducted from the Warren general offices in Pittsburgh.

IIT Scores Again—A simple, inexpensive way to produce purer high melting point metals has been developed at Illinois Institute of Technology. Process produces titanium, zirconium, chromium, hafnium, nobium, and vanadium directly from their oxides. It is patented by Dr. L. F. Mondolfo, director of metallurgical engineering.

Cited for Research — Harbison-Walker Refractories Co. is erecting a research center on a 21-acre suburban site south of Pittsburgh. When completed next year, the $1 million project will house all the company's extensive research activities. Employing about 100, the center will study highly refractory materials and development of processes for converting them into industrial products. Ample provision will be made for future expansion.

Good Reviews—The American Zinc Institute's film, entitled: "How Zinc Controls Corrosion," will be made a permanent archive at the U. S. Library of Congress. The 16 mm, 38-minute film depicts the properties of zinc and ways it protects steel and other metals from corrosion. It explains the mechanism of corrosion showing in detail how zinc coatings are applied to steel products.

Epoxy Technology—A new division of Epoxy Resin Formulators has been organized in The Society of the Plastics Industry, Inc. Purpose is to help the customer by advancing epoxy resin technology. This division will cover the electrical, tooling and adhesives fields.

Canning Season—American Can Co. has opened its second plant for the processing of tinplate from coils in Oakland, Calif. This is part of Canco's $27 million construction and equipment program. Later this year or early in 1958, other coil plants will be opened in Los Angeles, Milwaukee, St. Louis, Houston, Hammond, Ind., and Hillside, N. J.

New Look — For the fifteenth consecutive year, the Purchasing Agents Assn. of Baltimore will hold an exhibit of manufactured products. Exhibit will include office equipment and business machines. It will be held at the Lord Baltimore Hotel, Sept. 24-26.

Boilers to Missiles—The Cleveland Marine Office of Babcock & Wilcox has a contract for about $2 million from the Defoe Shipbuilding Co., Bay City, Mich. Contract is to furnish eight boilers for two guided missile-carrying U. S. Navy destroyers.

New Channel—Ellicott Machine Corp., Baltimore, Md., has acquired the floating dredge business of Bucyrus-Erie Co., S. Milwaukee, Wis. Acquisition includes all manufacturing rights, drawings, engineering data, patterns, etc. Ellicott is prepared to supply repair and replacement parts for all dredges built by Bucyrus.

"My auto's in the garage being repaired."

Pickpocket to the tune of $6 billion a year

Yes, *rust*—persistent destroyer of unprotected metal—costs America some $6 billion a year. Yet so much of that staggering waste can so easily be avoided.

How? By using a steel such as Weirkote, with its tightly bonded zinc coating that gives any product or structure the necessary corrosion-resistant finish to repel this destructive glutton year after year.

Weirkote protects steel with a zinc "skin." For it has such a tight and thorough bond, that rust hasn't a speck of bare, exposed steel to feed on. Its coating will not flake or peel even under the most severe fabricating stress: roll forming, spinning, crimping, deep-drawing, stamping, bending. It can be worked and shaped to the very limits of the steel base itself. So whatever the end form, there's zinc protecting the entire surface. No exposed steel. Thus, no corrosion.

Remember, $6 billion is a staggering sum to lose to rust every year. What will it cost you to inquire about the savings Weirkote zinc-coated steel offers you? Just the cost of a post card. Send today for your free booklet giving you a complete new profits picture. Write Weirton Steel Company, Dept. A-24, Weirton, West Virginia.

WEIRTON STEEL COMPANY

WEIRTON STEEL COMPANY

WEIRTON, WEST VIRGINIA

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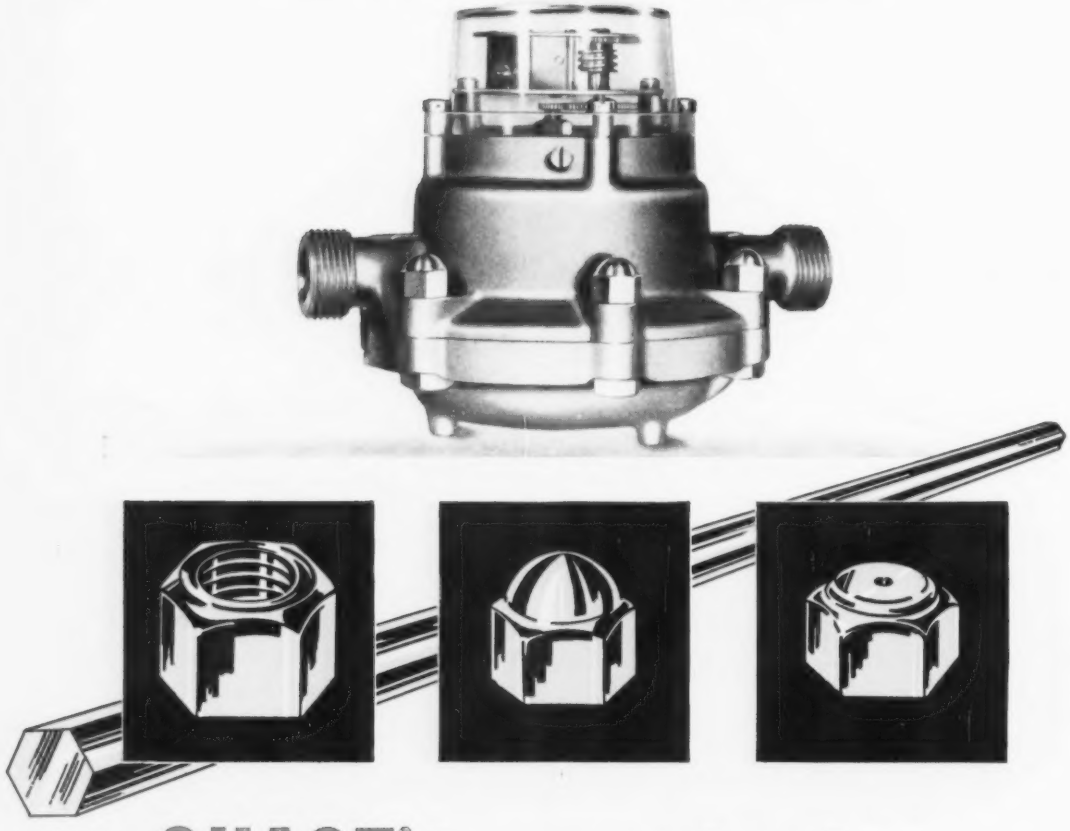
NATIONAL STEEL CORPORATION

They solved a "MUSHY" machining problem at Buffalo Meter Company...



with CHASE® free-cutting brass rod!

Production runs more smoothly now at the Buffalo Meter Co.—with Chase Free-Cutting Brass Rod on the job!

Though nuts seem a simple, non-critical item, Buffalo machinists complained of "mushiness" in rod formerly used to fabricate special acorn and stuffing box nuts. Thread cutting was poor; strength of finished threads less than desired.

Chase studied the problem, and by specially modifying top-grade brass rod, came up with stock superior to any yet tried. Result: *rod that stands up to tools better...gives sharper, cleaner threads.* To quote this satisfied Chase customer: *"Definitely a noticeable improvement over that of a competitor used on the same job last year."*

Why not have a Chase trouble-shooter look in on your shop?

Bring your production problems to... Chase®

BRASS & COPPER CO.

WATERBURY 20, CONNECTICUT

SUBSIDIARY OF KENNECOTT COPPER CORPORATION

The Nation's Headquarters for Brass, Copper and Stainless Steel

Atlanta Baltimore Boston Charlotte Chicago Cincinnati Cleveland Dallas Denver Detroit Grand Rapids Houston Indianapolis Kansas City, Mo. Los Angeles Milwaukee Minneapolis Newark New Orleans New York (Maspeth, L.I.) Philadelphia Pittsburgh Providence Rochester St. Louis San Francisco Seattle Waterbury

W. G. Reynolds, named president, Reynolds International, Inc.

F. H. Norton, elected vice president, sales, Pittsburgh Forgings Co., Coraopolis, Pa.; **W. H. Stocking,** elected executive vice president; **E. H. Eaton,** elected vice president and treasurer; **P. T. Brennan,** elected asst. secretary and asst. treasurer; **W. E. Latta,** appointed manager, Forge Div., Coraopolis plant.

J. M. Johnston, elected vice president, manufacturing, The Victoreen Instrument Co., Cleveland.

E. P. Heiles, elected vice president, Surface Combustion Corp., Toledo, O.

W. B. Cott, named asst. to the vice president, Air Conditioning Div., Stauton, Va., Westinghouse Electric Corp.

C. A. Sellen, named general manager, Reliance Div., Eaton Mfg. Co., Massillon, O.

R. E. Esch, elected vice president, Vickers, Inc., Detroit.

D. C. Fulton, appointed manager, Heat Transfer Apparatus Dept., Steam Div., Westinghouse Electric Corp.

W. A. Evanko, appointed district manager, The Baker-Raulang Co., Chicago.

C. H. Eisenhardt, Jr., appointed eastern area manager, sales, American Steel & Wire Div., U. S. Steel Corp.

R. P. Hobson, appointed works manager, stainless steel plant, Coshocton, O., The Universal-Cyclops Steel Corp.

Donald Williams, appointed director, corporate relations, The Dow Chemical Co., Midland, Mich.

F. E. Theis, becomes superintendent, shops, Indiana Harbor Works, Youngstown Sheet & Tube Co.; **N. P. Hitchcock,** named superintendent, maintenance and power.

William Mohr, appointed works manager, Pacific Coast Div., The Colorado Fuel & Iron Corp., Oakland, Calif.

T. P. Styslinger, appointed asst. plant manager, Trenton plant. American Bridge Div., U. S. Steel Corp.

D. A. Bessmer, elected executive vice president, The Timken Roller Bearing Co.

W. D. Spaulding, named technical advisor, basic operations, National Steel Corp.'s engineering staff.

J. L. VanNort, becomes midwest regional sales manager, Reliance Electric & Engineering Co., Cleveland; **R. O. Gee,** named manager, application engineering; **G. E. Law,** named manager, service; **W. C. McConnell,** named manager, general products; **A. P. DiVincenzo,** appointed manager, control engineering and **J. J. Dailey, Jr.,** named

Another MINSTER First in Press Design Operating in Production Lines Since 1953 Has Proved That You *Can* Get

More Single Stroke Operations

The exclusive "hidden value" in the Minster MS2 press is Minster's patented Intermediate Shaft Combination Air Friction Clutch and Brake Drive arrangement.

This drive arrangement makes it possible to get a higher single stroke efficiency, based upon rated continuous press speed, and the widest speed selection ever available on large double geared straight side presses.

Here's what this exclusive Minster feature can mean to you

- **More production on manually fed or automated presses.**
- **Faster starting and stopping . . . more single stroke operations per minute.**
- **Less flywheel energy loss . . . lower power consumption.**
- **Reduced clutch wear . . . less maintenance and adjustment.**
- **You may select either the faster speeds of a conventional single geared machine or the slower speeds of a double geared press. Two-speed drive (optional) allows selection of a speed to fit different type operations.**

How it works:

MS2 presses are double geared and have twin drive gears on the crankshaft. Minster's patented Combination Air Friction Clutch and Brake unit is mounted on a slower turning *intermediate shaft* instead of within the flywheel on the high speed drive shaft.

This means lower contact speed of clutch friction surfaces, resulting in very little heat on linings and less wear.

Flywheel can be run at maximum RPM for maximum energy without limiting speed of operations.

Additional Minster MS2 Press Features

Minster Recirculating Oil Lubrication system provides continuous oil film on all bearing surfaces . . . allows closer bearing and gib clearances for reduced lash and better slide guiding.

All air, lubrication and electrical systems are complete, enclosed within the press frame line, yet easily accessible. Electrical circuits and pneumatic systems for manual or automated production. Controls mounted within cabinet type uprights.

Massive, box type, four-piece tie rod frame for rigidity.

Precise slide to bed parallelism. Slide fully guided within gibs before midstroke is reached.

Outboard drive sheave for easy belt changing.

All wear surfaces bronze-lined, precision fitted and replaceable.

Per Minute

MINSTER®
MS2 Presses

150 TO 500 TON CAPACITIES

in five widths R to L in each capacity—two F to B dimensions in each capacity.

Dimensions meet J.I.C. Standards

THE MINSTER MACHINE COMPANY
MINSTER, OHIO

manager, control manufacturing, Euclid plant; **F. R. Terrant,** named asst. manager, engineering, Ivanhoe Div.

F. W. Holbrook, appointed marketing manager and **G. L. Essig,** named sales manager, The Am-Forge Div., American Brake Shoe Co.

Carl Ludwig, named chief engineer, Engineered Products Div., Wellman Engineering Co.

J. W. Gallagher, appointed manager, marketing, Special Products Div., Lord Mfg. Co., Erie, Pa.

J. R. Poyser, Jr., appointed works manager, Leece-Neville Co., Cleveland.

C. Cone, elected vice president, Surface Combustion Corp., Toledo, O.

F. J. Zielsdorf, appointed director, planning, The Oliver Corp., Chicago; **L. L. Lenth,** promoted to plant manager, York plant.

E. C. Davis, appointed sales manager, Industrial Hydraulics Div., Parker Appliance Co., Cleveland, O.

E. L. Martinez, promoted to manager, Boston sales office and **E. H. Killheffer, Jr.,** named manager, Buffalo sales office, The Dow Chemical Co.

J. B. Graef, named manager, aviation industry sales, Westinghouse Electric Corp.

Dr. J. H. Hoke, appointed supervisor, stainless steels section, Central Research Laboratory, Crucible Steel Co. of America, Pittsburgh.

R. H. Isenberg, named plant metallurgist, **J. I. Orrison,** named asst. plant metallurgist, Pittsburgh Steel Co.'s Monessen Works.

G. C. Nordenholt, appointed industrial hydraulics application engineer, Springfield, N. J., office, Vickers, Inc.

M. A. Carley, appointed divisional accounting coordinator, Consolidated Electrodynamics Corp., Pasadena, Calif.

W. A. Callison, named vice president of national accounts, Alco Products, Inc., Chicago.

J. H. Williams, appointed manager, Los Angeles office, The Torrington Co., Torrington, Conn.; **W. B. Chandler,** named asst. sales

MEEHANITE CASTINGS ARE MADE ONLY BY MEEHANITE FOUNDRIES

The American Laundry Machinery Co., Rochester, N. Y.
Atlas Foundry Co., Detroit, Mich.
Banner Iron Works, St. Louis, Mo.
Barnett Foundry & Machine Co., Irvington, N. J.
Blackmer Pump Co., Grand Rapids, Mich.
Centrifugally Cast Products Div., The Shenango Furnace Co., Dover, Ohio
Compton Foundry, Compton, Calif.
Continental Gin Co., Birmingham, Ala.
The Cooper-Bessemer Corp., Mt. Vernon, Ohio and Grove City, Pa.
Crawford & Doherty Foundry Co., Portland, Ore.
DeLaval Steam Turbine Co., Trenton, N. J.
Empire Pattern & Foundry Co., Tulsa, Okla.
Florence Pipe Foundry & Machine Co., Florence, N. J.
Fulton Foundry & Machines Co., Inc., Cleveland, Ohio
General Foundry & Mfg. Co., Flint, Mich.
Georgia Iron Works, Augusta, Ga.
Greenlee Foundry Co., Chicago, Ill.
The Hamilton Foundry & Machine Co., Hamilton, Ohio
Hardinge Company, Inc., New York, N. Y.
Hardinge Manufacturing Co., York, Pa.
Johnstone Foundries, Inc., Grove City, Pa.
Kanawha Manufacturing Co., Charleston, W. Va.
Koehring Co., Milwaukee, Wis.
Lincoln Foundry Corp., Los Angeles, Calif.
Nordberg Mfg. Co., Milwaukee, Wis., and St. Louis, Mo.
Palmyra Foundry Co., Inc., Palmyra, N. J.
The Henry Perkins Co., Bridgewater, Mass.
Pohlman Foundry Co., Inc., Buffalo, N. Y.
The Prescott Co., Menominee, Michigan
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Ross-Meehan Foundries, Chattanooga, Tenn.
Sonith Industries, Inc., Indianapolis, Ind.
Standard Foundry Co., Worcester, Mass.
The Stearns-Roger Mfg. Co., Denver, Colo.
Valley Iron Works, Inc., St. Paul, Minn.
Vulcan Foundry Co., Oakland, Calif.
Washington Iron Works, Seattle, Wash.
Dorr-Oliver-Long, Ltd., Orillia, Ontario
Hartley Foundry Div., London Concrete Machinery Co., Ltd., Brantford, Ontario
Otis Elevator Co., Ltd., Hamilton, Ontario

SEND FOR FREE BULLETIN

"Casting Soundness Can Be Controlled"

Write today to Meehanite Metal Corporation, Dept. IA, 714 North Avenue, New Rochelle, N. Y.

MEEHANITE®

The tiny steel balls shown in the race ways of the Meehanite grinding plate are precision-made by the WINSTED BEARING COMPANY, Winsted, Connecticut.

Miniature steel balls are ground perfectly round on grinding plates cast in Meehanite metal

The fine grain structure and uniform solidity of Meehanite grinding plates enable the Winsted Bearing Company of Winsted, Connecticut to make miniature steel balls to the exacting requirements of the precision industries.

These exceptionally dense grinding plates, cast in quality controlled type "GA" Meehanite metal, provide long service life, maintain dimensional accuracy and can be heat treated without fear of distortion. In addition, Meehanite plates have high tensile strength (over 50,000 psi), high modulus of elasticity, low co-efficient of thermal expansion, excellent wear resistance and good machinability.

The tiny steel balls shown are used in miniature bearings, ball point pens and other precision instruments. They are made with the highest degree of uniformity and dependability. Each ball must be spherical within three to four millionths of an inch, can vary in size no more than five millionths of an inch and the surface finish must be better than half a micro-inch.

Meehanite grinding plates have been used by the Winsted Bearing Company for over six years with very satisfactory results.

If you would like more detailed information about the physical properties of Meehanite casting, write today for Bulletin AR-130 "Casting Soundness Can Be Controlled."

Over 20,000 steel balls ground perfectly round on Meehanite grinding plates are held in the teaspoon. The hermetically sealed glass jars contain over 50,000 balls.

MEEHANITE BRIDGES THE GAP BETWEEN CAST IRON AND STEEL®

MEEHANITE METAL

MEEHANITE METAL CORPORATION, NEW ROCHELLE, NEW YORK

ANY PLATER CAN AFFORD
THIS NEW ANSWER TO AN
OLD CHROME PLATING PROBLEM

UDYLITE
ZERO-MIST H.T.*

NOW YOU CAN COMPLETELY CONTROL MIST AND SPRAY FROM CHROMIUM PLATING BATHS

AT A VERY REASONABLE COST

LOW INSTALLATION COST: This new product of Udylite Research is so powerful that you need add only 1½ *pounds* to a 1000 *gallon* chromium plating solution to get perfect results.

LOW MAINTENANCE COST: The addition of as little as ¼ to ½ lb. in an 8-hour working day maintains mist and spray control. Its only loss is through dragout.

COMPLETELY STABLE: It's *completely stable;* it doesn't lose any of its strength during shut downs no matter how long they must be.

OPERATES AT HIGH TEMPERATURES: For the first time *the temperature of the bath has no effect on mist control.* Zero-Mist H.T.* works at any bath temperature, even boiling.

EASE OF CONTROL: It's *easy to control.* With the addition of Zero-Mist H.T.*, a thin foam blanket subsides when current is turned off, but reforms as the bath is again used. This foam blanket provides the simple visible check for efficient operation.

LOW COST • VISUAL CONTROL
STABILITY • *HIGH TEMPERATURE OPERATION

ZERO-MIST H.T. HAS THEM ALL

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

WORLD'S LARGEST PLATING SUPPLIER

manager, Bearings Div., Torrington, Conn.

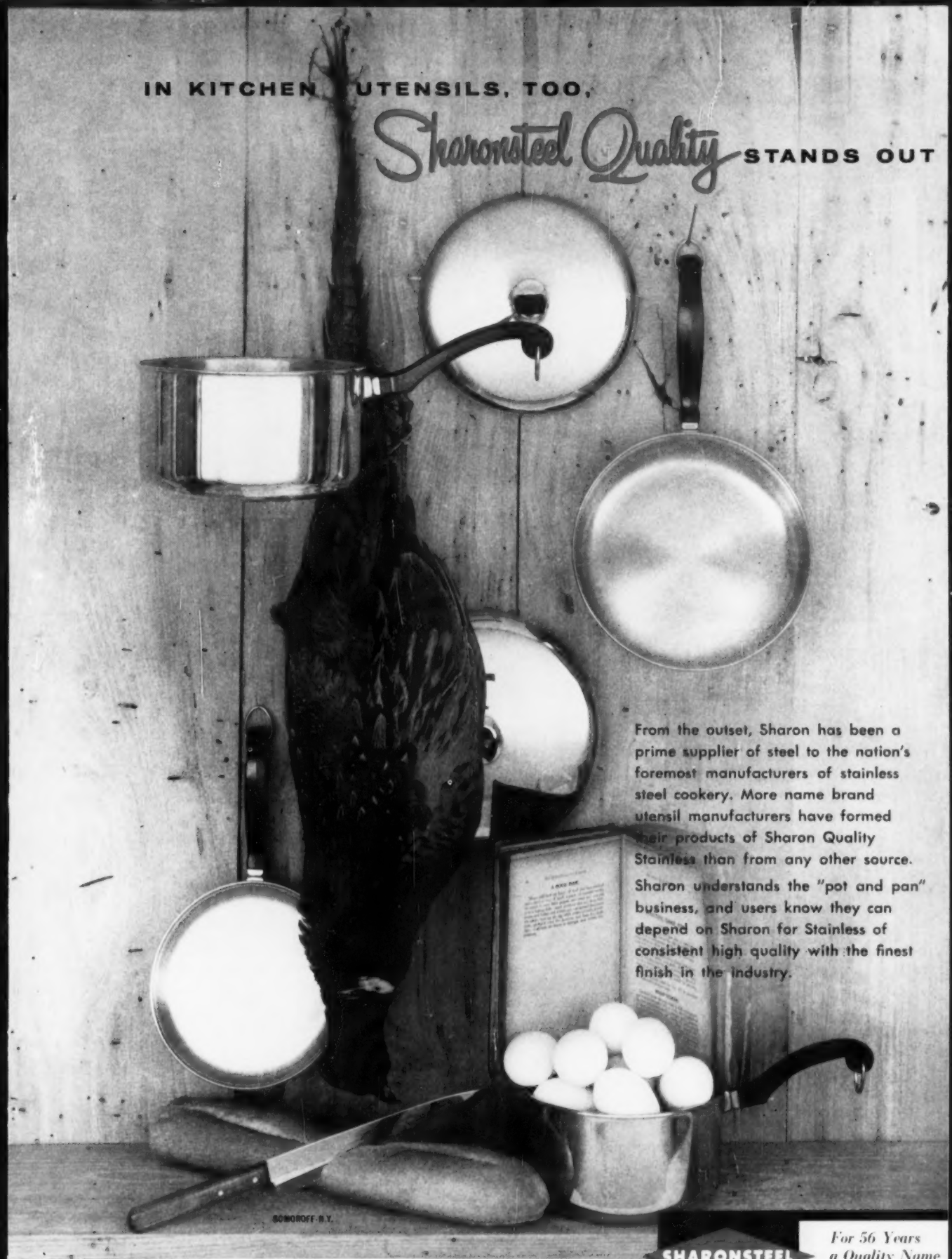
M. P. Orr, appointed manager, roll sales, Mackintosh - Hemphill Div., E. W. Bliss Co., Pittsburgh.

D. L. Boyes, appointed general manager, Delco-Remy Div., General Motors Corp.; **W. E. Milner,** named general manager, Hyatt Bearing Div.; **A. F. Davis,** named general manager, Diesel Equipment Div.

R. E. Hickey and **J. R. Foster,** appointed sales engineers, Sales & Order Depts., Houston office, L. B. Foster Co.; **E. G. Giles,** named asst. manager, Order & Traffic Dept.

C. M. Brown, appointed manager, Fine Metals & Chemicals Div., Product & Process Development Dept., Electro Metallurgical Co., Niagara Falls, N. Y.

J. M. Howard, Jr., named general manager, Spring & Forge Div.,


IN KITCHEN UTENSILS, TOO,
Sharonsteel Quality STANDS OUT
From the outset, Sharon has been a prime supplier of steel to the nation's foremost manufacturers of stainless steel cookery. More name brand utensil manufacturers have formed their products of Sharon Quality Stainless than from any other source.
Sharon understands the "pot and pan" business, and users know they can depend on Sharon for Stainless of consistent high quality with the finest finish in the industry.
SOMOROFF-N.Y.

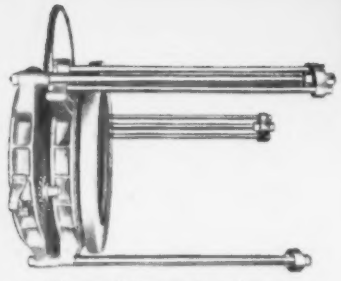
SHARONSTEEL

For 56 Years a Quality Name in Steel

CHICAGO, CINCINNATI, CLEVELAND, DAYTON, DETROIT, GRAND RAPIDS, INDIANAPOLIS, LOS ANGELES, MILWAUKEE, NEW YORK, PHILADELPHIA, ROCHESTER, SAN FRANCISCO, SHARON, SEATTLE, MONTREAL, TORONTO

169

SHARON STEEL CORPORATION, SHARON, PENNA.



Thermal Expansion Type

Linear expansion of the thermal tubes frees the goggle plate for swinging to open or closed position. The contraction of the tubes clamps the plate, forming a gas-tight seal. Sizes: 36" to 120".

Mechanical Type

Powerful clamping force applied at all points around disc periphery provides a safe seal for gas mains from 6" to 84".

Bailey

GOGGLE VALVES

Bailey Valves assure safety plus efficient service on gas washers, blast furnace mains, precipitators and boiler plants. Bailey Valves operate satisfactorily, regardless of the length of time they may stand unused. Their dependability has been proven thoroughly by hundreds of installations in major steel plants.

WILLIAM M. Bailey COMPANY
ENGINEERS
LEADERSHIP THROUGH QUALITY

1221 BANKSVILLE ROAD PITTSBURGH 16, PA

Latrobe, Pa., headquarters, Alco Products, Inc.; **M. D. Raymond,** named marketing manager, Latrobe; **R. W. Pittman,** named central regional manager, Cleveland; **E. J. Brown,** named Pacific Coast regional manager, San Francisco.

E. W. Polley, appointed chief chemist, Youngstown district, Youngstown Sheet & Tube Co.

E. D. Cowlin, elected director and vice president, sales, Quality Fasteners, Inc., Kalamazoo, Mich.

R. E. Davies, appointed manager, production, Power Piping & Sprinkler Div., Blaw-Knox Co., Pittsburgh.

C. E. Carner, Jr., appointed national accounts sales manager, Yale Materials Handling Div., The Yale & Towne Mfg. Co.

G. A. Lee, appointed salesman, Philadelphia office, International Resistance Co.

C. K. Shank, promoted to works manager, Dodge Mfg. Corp., Mishawaka, Ind.; **Edwin Rhodes,** appointed purchasing agent and **Richard Kaiser,** named plant engineer.

J. H. Higginson, appointed sales representative, Detroit area, McKinney Mfg. Co.

J. L. Thoman, promoted to division industrial engineer, Stainless Steel Div., Warren, Mich., Jones & Laughlin Steel Corp.

E. T. Goddard, named traffic manager, Washington Iron Works, Seattle, Wash.

G. M. Hause and **E. P. Newsted,** appointed district sales managers, Los Angeles and San Francisco, districts, respectively, R-P&C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.

Following appointments are within the Technical Services Div. of Jones & Laughlin Steel Corp.;

Now! Ajax SALT BATH FURNACES with REMOVABLE SUBMERGED ELECTRODES

What used to be a costly, time-consuming job now takes only an hour or two at the most. Labor cost is next to nothing . . . and there is little or no "down time" for the heat treating equipment because Ajax Removable Submerged Electrodes can now be changed without tearing down either the furnace wall or the pot.

Electrodes enter from over the top and slant into the salt bath. *There are no openings below the salt line.* A ceramic tile over each pair of electrodes seals off all air and eliminates corrosion at the salt line. *Thus, all the inherent advantages of submerged design are assured.*

To expose the electrodes for rapid removal, it is only necessary to lift the tile. The entire job can be handled by unskilled labor. Actual electrode changing time is less than an hour per pair.

Write for Bulletin 810 giving full details.

REPLACE AJAX REMOVABLE SUBMERGED ELECTRODES

. . . at absolute minimum labor cost
. . . without costly shutdowns
. . . without tearing down either furnace or pot

AJAX
HULTGREN
electric SALT BATH furnaces

ANOTHER AJAX FIRST!

See it at the National Metal Show in Chicago, Nov. 4-8, 1957. BOOTH 1406

AJAX ELECTRIC COMPANY
904 Frankford Avenue, Philadelphia 23, Pa.
Associates: Ajax Engineering Corp.; Ajax Electrothermic Corp.

C. F. Underwood, promoted to metallurgical contact engineer, tubular products, Houston, Texas, sales office; **J. J. Lenker** and **W. R. Cochran,** appointed development engineers, product improvement section, tubular products, Aliquippa Works.

W. J. Downing, assigned to the Los Angeles district sales office, Superior Steel Corp., Carnegie, Pa.

W. A. Minix, appointed chief gage engineer, Freeland Gauge Co., Detroit, Mich.

R. W. Witchger, named chief inspector, U. S. Graphite Co., Saginaw, Mich.

R. C. Grinnell, appointed western sales representative, The Steelcraft Mfg. Co., Cincinnati.

J. P. Rhodes, appointed purchasing agent, Pennsylvania Transformer Div., McGraw-Edison Co.

J. J. Wagner, appointed sales representative, Grinding Wheel Div., Electro Refractories & Abrasives Corp., Buffalo.

E. W. Engle, appointed development engineer, Kennametal, Inc., Latrobe, Pa.

T. E. Colvin, appointed consulting naval architect, Kaiser Aluminum & Chemical Sales, Inc., Chicago.

J. T. MacLean, Jr., appointed sales representative, midwestern regional office, Alloy Tube Div., The Carpenter Steel Co.

OBITUARIES

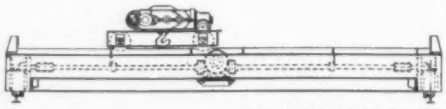
H. B. Spackman, 58, president and chief executive officer, Lyon Metal Products, Inc.

W. E. Cotter, 64, counsel for Union Carbide Corp.

F. J. Laskey, 70, retired director of purchases, Republic Steel Corp.

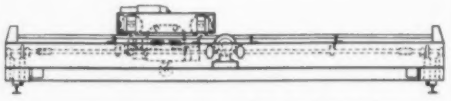
H. H. Johnson, 56, director of research, National Malleable & Steel Castings Co., Cleveland.

STANDARD HEADROOM
Provides highest hook height with top-running trolley and foot mounted hoisting unit.



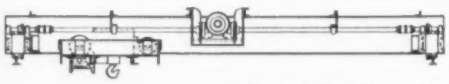
Model DTMD—TT

MEDIUM HEADROOM
Here the hoisting unit is rigidly suspended from the top-running trolley to reduce clearance over rail.



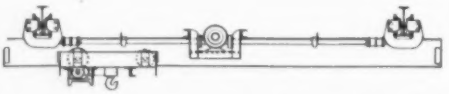
Model DTMD—LT

LOW HEADROOM
Under-running trolley permits unusually high hook lift. Use it where clearance under bridge must be maximum.



Model DTMD—UT

SUSPENDED TRACK
Operates on lower flange of crane runway suspended from roof guiders or other overhead support. Use also where load transfer is desired.



Model DUMD—UT

there is a

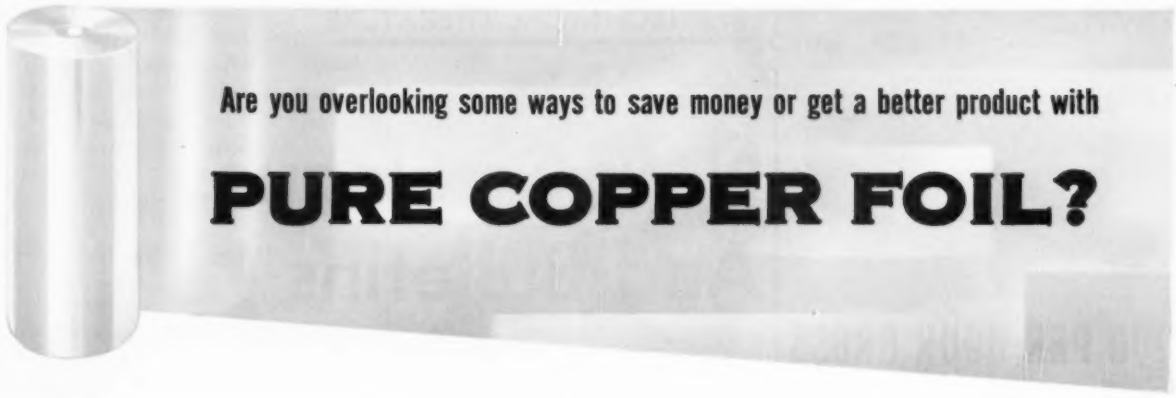
CRANEMASTER

for any building condition

Send For **BULLETIN C-108**

Describes in detail the many design and operating advantages of CRANEMASTER overhead traveling cranes. Also explains how Abell-Howe provides competent service from original survey to final installation.

ABELL-HOWE COMPANY 7747 Van Buren Street • Forest Park, Illinois



Are you overlooking some ways to save money or get a better product with

PURE COPPER FOIL?

ANACONDA
"Electro-Sheet" Copper Foil

Copper is deposited, under carefully controlled conditions, onto huge rotating drums and stripped off.

GAGES. ½ oz. per sq. ft. (.0007″)
1 oz. per sq. ft. (.0014″)
2 oz. per sq. ft. (.0028″)
3 oz. per sq. ft. (.0042″)
4 oz. per sq. ft. (.0056″)
5 oz. per sq. ft. (.0070″)
6 oz. per sq. ft. (.0084″)
7 oz. per sq. ft. (.0098″)

WIDTHS. Slit to ordered widths in ⅛″ increments from 6″ to 62″ trimmed, or 64″ untrimmed.

LENGTH. In continuous length rolls, varying by gage. Only limiting factor is weight of full-width roll.

COMMERCIAL QUALITY. Available in the full range of gages.

PRINTED-CIRCUIT QUALITY. Quality carefully controlled to conform with N.E.M.A. Specification for copper foil. Clean, bright surface on one side relatively free from pits, scratches, nodules, and surface inclusions. The reverse side has a matte finish for high bond strength between the base material and the copper. Furnished in gages from 1 oz. per sq. ft. (.0014″) to 7 oz. per sq. ft. (.0098″) and to exceptionally close gage tolerances of ± .0003″ for 1 oz. and 2 oz., and ± .0006″ for 3, 4, 5, 6 and 7 oz. weights.

FURNACE-BRAZING QUALITY. Clean and free from surface residues. Furnished in thicknesses from 1 oz. to 7 oz. per square foot.

ELECTROSTATIC SHIELDING. To prevent leakage, in or out, of stray currents which affect the proper functioning of electrical equipment—transformers, radio and TV receiving sets, electrodiathermy equipment – broadcasting buildings, hospital operating rooms, X-ray rooms.

DAMP-PROOFING AND VAPOR SEAL. "Electro-Sheet" is available bonded to high-grade building paper, cloth, or asphaltic compounds —strong, flexible, easy to handle—an economical solution to many varied problems of water-, moisture-, vapor-, and wind-proofing.

GASKETS. "Electro-Sheet" bonded to paper, fabric, or compounds.

CAPPING. For such things as utility poles and fencing to prevent moisture from entering open end pores of wood, causing rot.

CABLE WRAPPING. Bonded to paper or fabric, and corrugated to conform to spiral winding without rupture.

REFLECTOR SURFACE. To reflect both heat and light.

DECORATION. "Electro-Sheet" is easily bonded to plywood, paper, cardboard, plastics for decorative effects in products, displays, advertising. It takes printing or silk screening.

PRINTED CIRCUITS. Rigidly controlled quality "Electro-Sheet" for the exacting use of fabricating electric circuit wiring by the printing-etching method and by die stamping.

FURNACE BRAZING. For bonding of various metals together by furnace brazing in a reducing atmosphere.

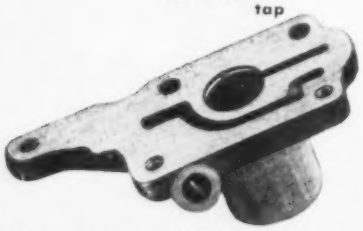
"Electro-Sheet" Copper Foil was developed by Anaconda to provide the positive and durable protection of copper at low cost. It is nonrusting, vermin-proof, nonflammable and impervious to penetration by water, air, or moisture. For detailed information or help in application to your products write: The Ansonia Division, The American Brass Company, Ansonia, Conn. B252

ANACONDA®

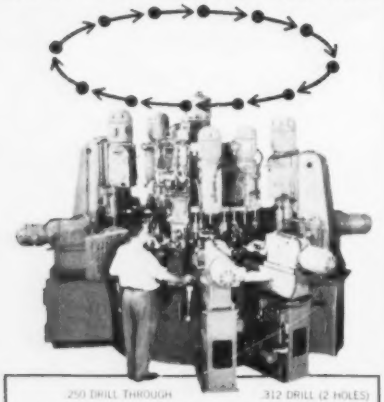
"ELECTRO-SHEET" COPPER FOIL

SOLD BY THE AMERICAN BRASS COMPANY

mill
drill
ream
recess
spot face
countersink
tap



200 PER HOUR GROSS



This Kingsbury has a central column and 12 stations, and 13 automatic operating units. Clamping and unclamping are automatic. All units operate at the same time, while the operator is changing parts in the fixture.

Most Kingsburys are less elaborate. But all have the same purpose:

uniform operations
at a high production rate
to the customer's specification
at low unit cost

May we get together on one of your jobs, simple or complex? Kingsbury Machine Tool Corporation, Keene, N. H.

KINGSBURY

INDEXING AUTOMATICS for high production drilling and tapping

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, p. 113.

Milling Cutters

Forty-nine types of solid high-speed steel milling cutters are described in a catalog. These cutters are designed for machining aluminum, light metal alloys and ferrous materials. (Goddard & Goddard Co.)

For free copy circle No. 1 on postcard, p. 113

Tube Fittings

Steel fittings for connecting steel tubing lines are shown by part nomenclature on a new wall chart. Included are standard flare type, flareless type and adapter fittings as well as a tube fitting size table. (Parker Appliance Co.)

For free copy circle No. 2 on postcard, p. 113

Tape Records

Magnetic tape's uses in instrumentation recording is discussed in a 16-page brochure. It delves into many facets of tape for recording scientific research and industrial process data. (Ampex Corp.)

For free copy circle No. 3 on postcard, p. 113

End Mills

Staggered notches in the cutting edges of new end mills result in accurate cuts and long tool life. So states a new data sheet. It recommends the end mills for working hard-to-machine metals and alloys. The literature describes possible economies and lists types and sizes available. They range from ⅜- to 1½-in. diams. (The DoALL Co.)

For free copy circle No. 4 on postcard, p. 113

Ammonia

In its 68 pages, a technical data book deals with anhydrous ammonia and ammonia liquor. It lists their chemical and physical properties, specifications, handling and storage features, unloading methods, analytical procedures, and bibliography. (For free copy, write on company letterhead to Nitrogen Div., Allied Chemical & Dye Corp., Dept. ALA, 40 Rector Street, New York 6, N. Y.)

Self-lube Bearings

Self-lubricating bearings are covered in a folder. These bearings are produced by the power metallurgy process. (Johnson Bronze Co.)

For free copy circle No. 5 on postcard, p. 113

Steel Shelving

Adjustable steel shelving is pictured in a bulletin. This 6-page publication presents six basic types available in an almost infinite number of variations and sizes. (Penco Metal Products Div., Alan Wood Steel Co.)

For free copy circle No. 6 on postcard, p. 113

Pillow Blocks

An 8-page bulletin describes a line of spherical roller bearing pillow blocks. It contains tabulated data on dimensions, shaft sizes,

weights and radial load ratings. It explains a new exclusive mount, which insures maximum bearing life by providing for fast and accurate seating of bearings on shafts. (Dodge Mfg. Co.)

For free copy circle No. 7 on postcard, p. 113

Hydraulics Tester

A brochure describes the operation of a newly designed hydraulic accessories test machine. This machine performs functional and operational testing of all types and sizes of hydraulic components. These might include valves, actuators, regulators, plumbing, tube and hose lines, manifolds, hand pumps and other hydraulic accessories. (Greer Hydraulics, Inc.)

For free copy circle No. 8 on postcard, p. 113

Job Shop

One company's facilities for contract welding, machining, gear cutting and press rebuilding are presented in a 32-page booklet. It reviews equipment available, capacities and capabilities. (For free copy, write on company letterhead to Verson Allsteel Press Co., 9300 S. Kenwood Ave., Chicago 19, Ill.)

Air Control Valve

Pilot air valves sometimes get worn and leak when dirt, grit and abrasives settle around the valve stem. To combat such wear a firm has produced a new series of pilot valves. A basic part of these is a small synthetic rubber boot; this snaps in place around the valve stem. This seals all critical parts from harmful abrasive materials. A catalog describes the valves. (Hanna Engineering Works.)

For free copy circle No. 9 on postcard, p. 113

Conveyor Belts

Conveyor and transmission belting turned out by one maker is being made by a new "balanced belt construction" method. This process, says a company publication, results in electronically equalized tension of each ply in the belt. Combined with the firm's continu-

How can Analytical Equipment squeeze out more profit dollars?

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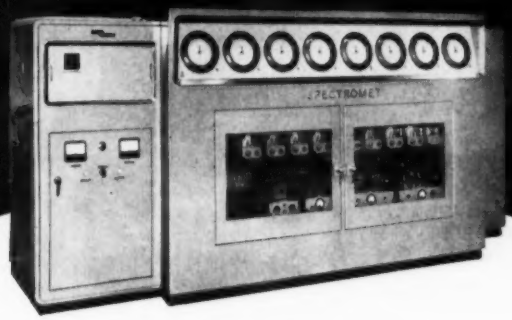

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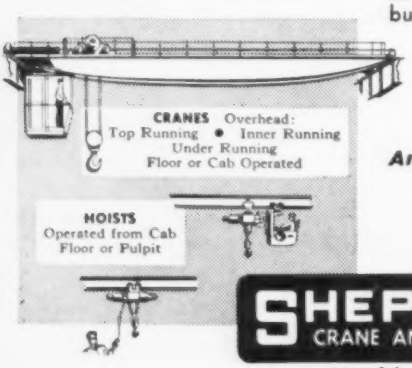

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FREE LITERATURE

ous vulcanization setup, it states, this assures the belting of complete uniformity. The literature gives an extensive analysis of the new process. (Boston Woven Hose & Rubber Co.)

For free copy circle No. 10 on postcard, p. 113

Bridge Building

Materials used on guyed structures and suspended systems are reviewed in a 22-page booklet. It covers wire, strand, rope, etc. Included are fittings and items for all such construction, with the lone exception of gigantic suspension bridge building. (John A. Roebling's Sons Corp.)

For free copy circle No. 11 on postcard, p. 113

Sander-Grinder

High - speed, pneumatic disc sander-grinders are briefly described in a data sheet. These are fast, light, compact, steady units, it says. They work at 10,000 to 12,000-rpm at air pressures of 70 to 90 psi. (Detroit Surfacing Machine Co.)

For free copy circle No. 12 on postcard, p. 113

Leak Finder

Got leak problems? In your vacuum or pressure equipment? Well, a new piece of literature has a suggested answer to this problem. It's a custom leak detection service offered by one firm. The publication describes it. Another bulletin outlines the company's moisture monitor unit now available. (Consolidated Electrodynamics Corp.)

For free copy circle No. 13 on postcard, p. 113

Stainless

Nickel-free straight chromium stainless steel is featured in a 28-page booklet. It presents physical properties, analysis, corrosion resistance, surface characteristics, fabrication, application, maintenance and bacteria cleanability, military specifications and availability of Type 430 stainless sheet and strip. (Washington Steel Corp.)

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These new highly soluble alloys are economical furnace additions for steels and high-temperature alloys made in the electric furnace. The "built-in" reducing action yields the alloying element quickly and uniformly to the melt. Thus you get:

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Both alloys are available in cans containing a definite weight of the alloying element, eliminating weighing and spillage. The ingredients are completely moisture-free. Shipments can be palletized for easier handling, storage, and inventorying. For further details, consult your nearest ELECTROMET representative.

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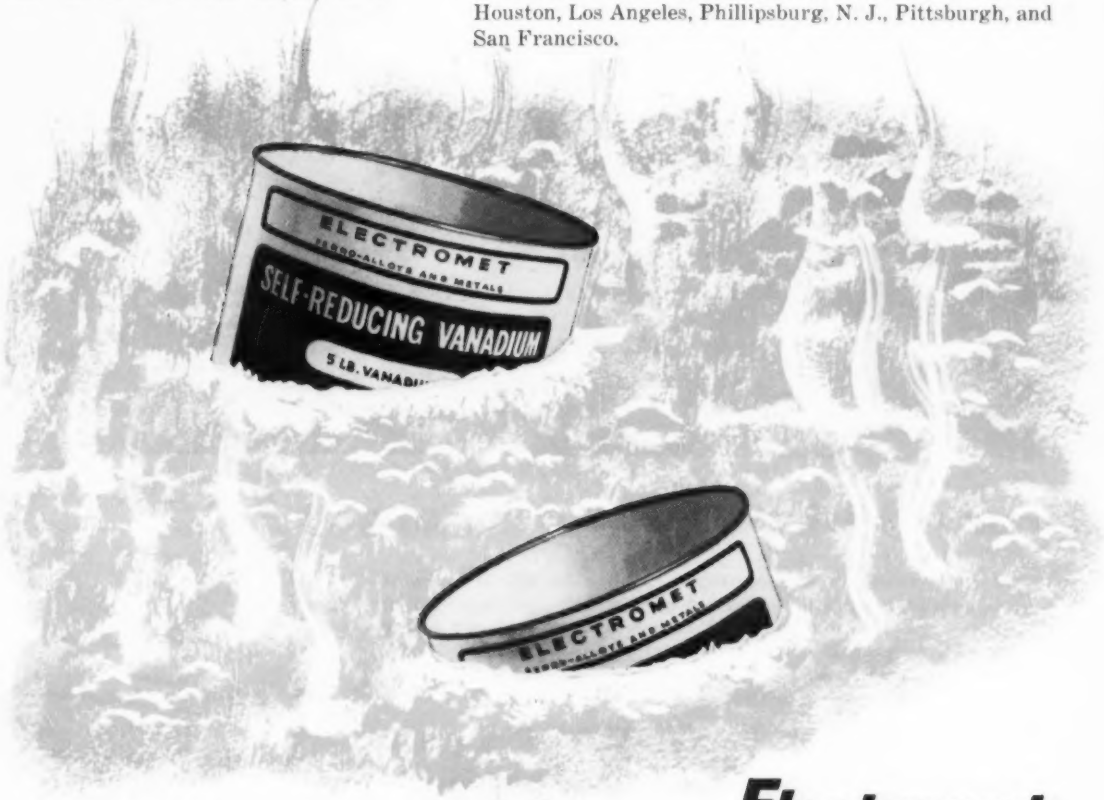

Proven in use! In commercial heats, 85 to 95 per cent tungsten recoveries and 98 to 100 per cent vanadium recoveries have been reported. Melters have been impressed by the rapid solubility of both alloys.

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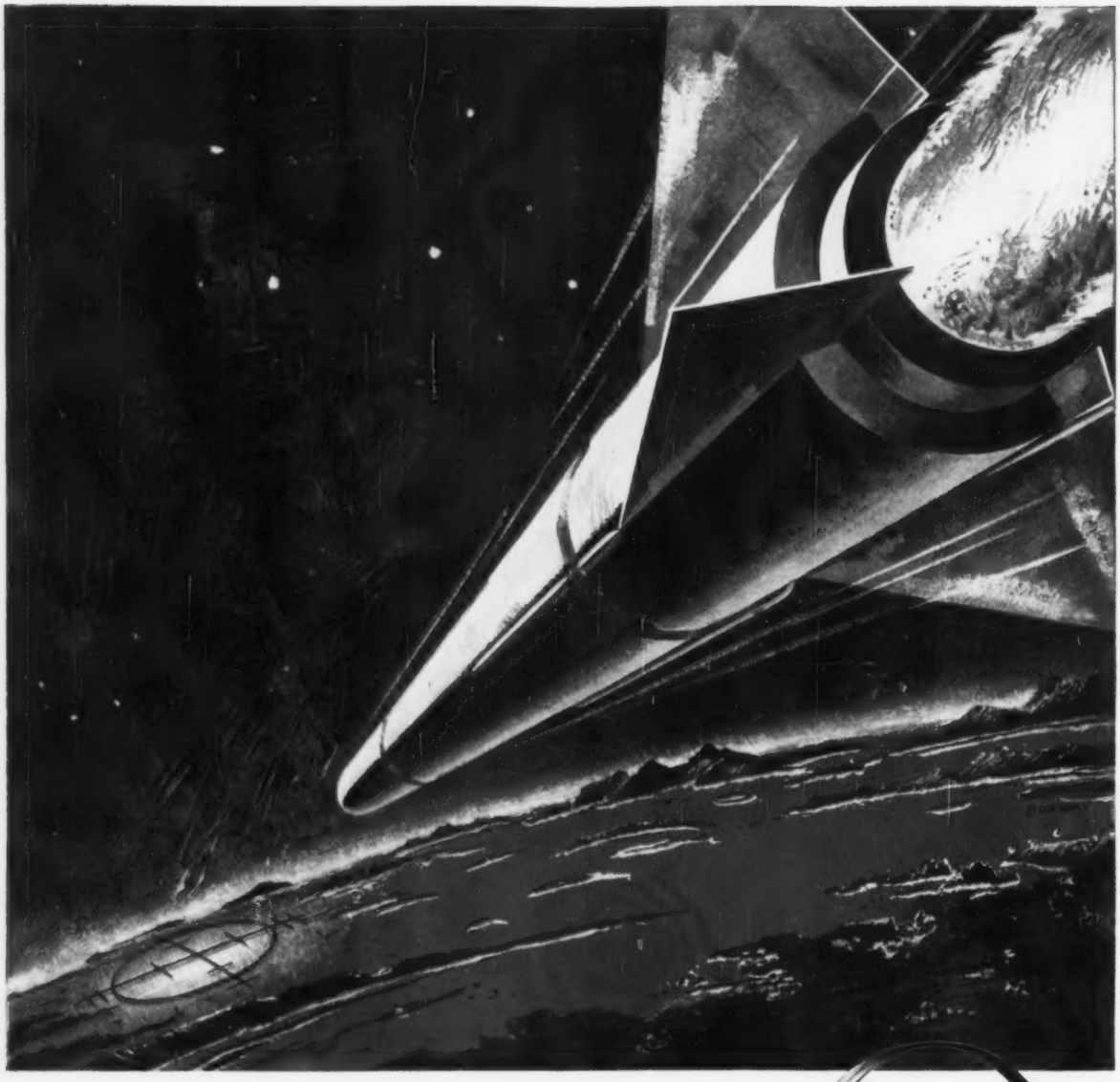

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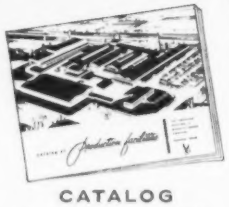

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Rolling Mill Aid

Described in an eight-page bulletin are the Punched Card and Slider Contact Panel Systems of setting-up schedules for rolling operations. (The Electric Controller & Mfg. Co.)

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Welding Solutions

A new, six-page technical bulletin takes up metal joining and repair problems peculiar to aluminum. It helps the welder overcome such factors as the absence of color change on heating. Welding rod and electrode characteristics for ideal results on all types of aluminum are given in table form. (Eutectic Welding Alloys Corp.)

For free copy circle No. 21 on postcard

Tank Fabricating

A 32-page color brochure is of special interest to design engineering and other equipment buying persons in the process industries. Described in the booklet are all major fabricating equipment and their capacities for thickness, length and width, tonnage, etc. (Chicago Steel Tank Co.)

For free copy circle No. 22 on postcard

Drill Jig Bushings

A new bushing catalogue is printed on heavy plastic-coated stock that resists water, oil and grease smudges. More standard bushing sizes have been added resulting in virtual elimination of specials. The catalogue gives bushing types and sizes, drill sizes with their decimal equivalents, concentricity of bushings and rockwell hardness. (American Drill Bushing Co.)

For free copy circle No. 23 on postcard

Fork Lift Truck

Engineering, design and construction features are outlined in a new illustrated piece of literature, BU-334A. Specifications cover the 10,000 lb lift, 230 cu in. engines available in gasoline, LP gas, and Diesel models. (Buda Div., Allis-Chalmers Mfg. Co.)

For free copy circle No. 24 on postcard

How To Order Die Sets

A detailed check-list of points in selecting and ordering a catalog die set is featured in the latest issue of "Die Set Digest." (The Producto Machine Co.)

For free copy circle No. 25 on postcard

Alloy Techniques

Metallurgists and design engineers who are concerned with heat resistant alloys and abrasion resistant materials will be interested in a new brochure on pure metals, master alloys and ferro alloys. This 22-page booklet covers various grades of chromium metal, chromium molybdenum, ferro alloys, tungsten melting base alloy, zirconium aluminum and vanadium aluminum. (Shieldalloy Corp.)

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Comparator

The operating features of a projection comparator-densitometer are described in four page bulletin. (Applied Research Laboratories)

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Handling Bulk Gases

A new, illustrated 16-page pamphlet discusses the bulk delivery method of handling industrial gases in large quantities. Catalog 450, entitled "Bulk Gas Delivery System," illustrates the several types of delivery units and explains the advantages of each. Typical in-

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stallations are pictured and unit specifications are tabulated for easy reference. (Air Reduction Co., Inc.)

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Titanium Carbide Alloy

Heat-resistant titanium carbide alloys and their many applications in the metalworking industries are presented in a new illustrated bulletin on Kentanium. It shows parts of simple and complex shapes that have been used successfully at temperatures ranging to above 1800°F. (Kennametal Inc.)

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Grinding Wheel Data

A two-page engineering data sheet (No. 5) lists grinding wheel recommendations for finishing overlays of Colmonoy hard-facing alloys. The new data sheet lists in tabular form recommended wheels for use on Colmonoy nickel-base, cobalt-base and iron-base alloys. (Wall Colmonoy Corp.)

For free copy circle No. 30 on postcard

Ore Investigation

A new ten-page illustrated bulletin describes the services of a well known laboratory to the mineral processing industry. The organization carries out investigation of ores, flow sheet development and plant design and construction. (Southwestern Engineering Co.)

For free copy circle No. 31 on postcard

Aircraft Fasteners

A complete line of precision, high-strength aircraft fasteners for airframe and engine use is reviewed in a new four-page aircraft products folder. Included are both tension and shear fasteners for weight-saving, temperature and heavy-load applications, all-metal, one-piece self-locking nuts and a preload-indicating washer called the PLI washer. New products include recently-introduced high-temperature fasteners with tensile strength of 170,000 psi minimum at 900°F. (Standard Pressed Steel Co.)

For free copy circle No. 32 on postcard

Slug Type Rivets

Test data on performance of slug type rivets show fluid-tight characteristics. Six-page booklet gives applications for aircraft industry. (Pastushin Industries, Inc.)

For free copy circle No. 33 on postcard

Giant Ladle Crane

An illustrated brochure gives complete technical data on design and capabilities of the world's largest ladle crane. Recently completed, the second of three of these 500-ton giants for a new Eastern steel mill will complete a 375-ton pour of hot metal in a single trip from furnace to mold. The book also includes information on other types of cranes and equipment. (Morgan Engineering Co.)

For free copy circle No. 34 on postcard

Vacuum Impregnation

"Engineering Data on Vacuum Impregnation with PE#1" gives complete technical information on the process which guarantees pressure tight castings. The six-page data sheet cites results with PE#1 insolving micro-porosity problems over the past 10 years. Cycles for batch and internal pressure impregnation, including simultaneous binding of dissimilar materials, are outlined and diagrammed, step by step. (Western Sealant Co.)

For free copy circle No. 35 on postcard

Beryllium Copper

One maker of lock sliders reduced the number of parts he needed from four to three by using beryllium copper. Naturally, he realized a cost saving due to fewer production operations, etc. A folder tells how the switch was made, lists advantages of the metal's usage. (The Beryllium Corp.)

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JalZinc is produced on this modern Sendzimir continuous galvanizing line. JalZinc has a tight, uniform coating that resists cracking and flaking. The uniform ductility, flatness and a high luster surface finish improve your product appearance.

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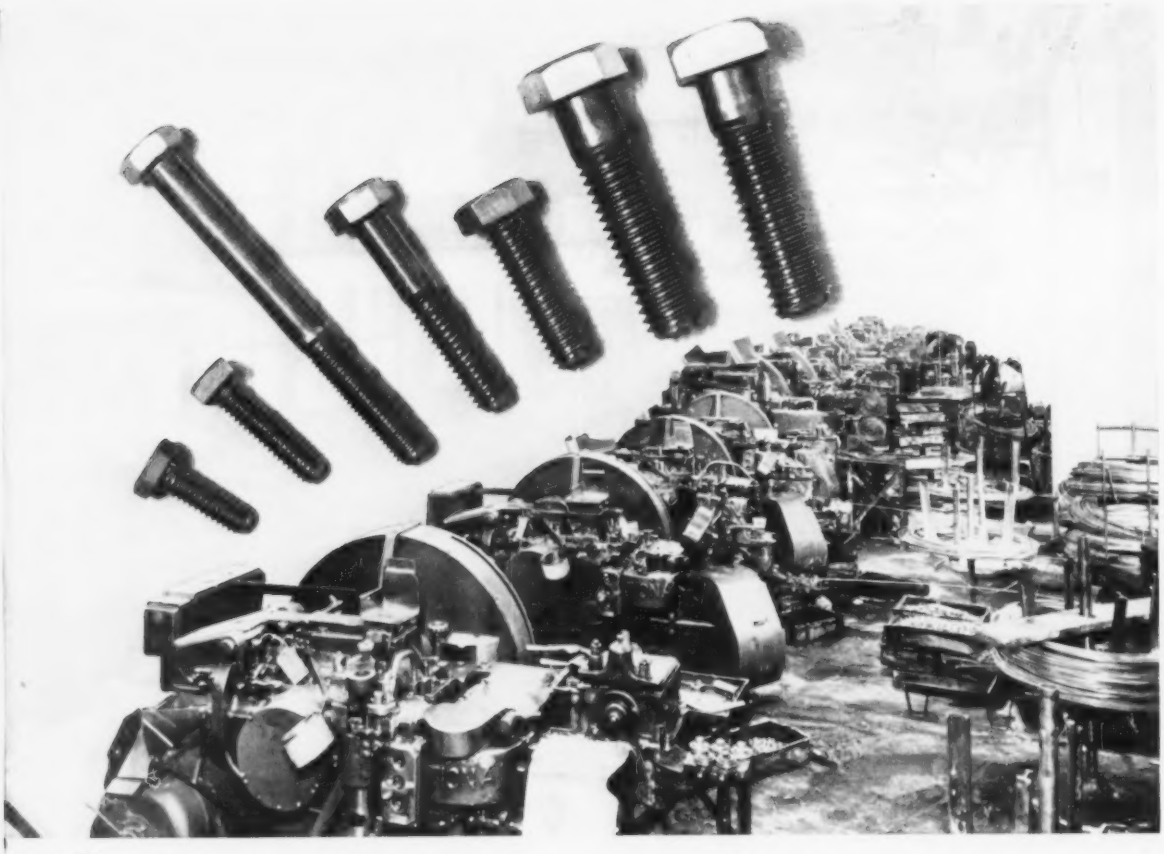

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The National Screw and Manufacturing Company, Cleveland, Ohio, one of America's oldest manufacturers of fasteners, relies on NATIONAL Boltmakers for fast, efficient bolt production.

The above photograph shows one battery of fifteen NATIONAL Boltmakers producing bolts ranging in size from 3/16" up to 1/2" in diameter at National Screw's Cleveland plant.

NATIONAL Boltmakers cut steel rod to proper length, extrude the blank, head, trim the head, point the end and roll the threads, *all automatically!* Grain flow in the head and threads is symmetrical and unbroken. The part is stronger because the cold-forging action increases fatigue resistance and tensile strength.

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How To Get More For Your Metalworking Dollar

Number 11 of a series

COPPER AND BRASS

Copper and brass go hand-in-hand with our way of life. In some ways, they reflect it; in others, they help to shape it. The TV set, the kitchen mixer, the air conditioner, the family car all tell a similar story —that copper plays an important part in making living a lot better.

To prove this point, statistics show that each person in the United States consumes about 18 lb of copper yearly. The average for the rest of the Free World is about 3 lb per person.

Engineering-wise, copper and its alloys have what it takes to assume a vital role in communications, electronics, automation, architecture and many other areas. From among its many alloys, which should you choose? Which form? Which temper? And if you start with the best, how will you end with the best? Here are some answers.

Selecting the Right Alloy: Key

When it comes to selecting the best metal or alloy for a specific job no one factor is so overpowering as to eliminate all others.

Copper alloys have some excellent combinations of properties. But to benefit by them takes careful sifting out of their pros and cons. By doing so, you'll find their "all-around" features.

■ For engineers, designers, metallurgists and the men who hold the purse strings, specifying which metal to use for each job is probably one of their biggest stumbling blocks. Rarely does the choice depend on one property. Most often, it's a compromise among an infinite number of elements.

In considering combinations of desirable properties, copper and copper-base alloys need not take a back seat to any group of metals. In fact, it's this very thing which gives these alloys their importance. And it doesn't make much difference whether the end use is ornamental or functional — the combinations of properties speak for themselves.

Copper alloys have several features which predominate so strongly that they meet little or no competition from other metals. For conductivity, both electrical and thermal, they're outstanding. Their corrosion resistance is excellent. They have high ductility and moderate tensile strength. For ease of workability, they're also hard to beat. On the decorative side, they have pleasing color. And where the end use may call for further finishing, copper alloys can be plated and lacquered very easily.

What To Order?—Selection of the right material for any specific product can be mighty complex. But the job can be simplified considerably by asking yourself two basic questions (1) What are the service requirements of the end product? (2) What processes will be used in fabrication?

By answering the first question, you can sift down your selection to those alloys which have the physical, mechanical and chemical properties you require. It'll also help you to determine whether your selection should be from among the wrought or cast alloys.

The second question takes into consideration the form of alloy, size, temper, tolerances and finish. Cost also enters as a factor in that savings are possible by ordering standard mill products, and by resorting to the more efficient methods of fabrication.

Seven Basic Groups — In the sifting-down process, your job of selection is further simplified by grouping the wrought alloys. The most widely used alloys are broken down into seven groups in the pull-out chart at the end of this feature. By glancing through the table, you can channel your selection to a few possibilities. In addition to the alloys listed, a number of mills produce alloys with special or built-in properties.

Each group of alloys among the seven listed has distinctive qualities apart from the others. For example, the first group includes those alloys which are considered to be commercially-pure coppers. Theoretically, they're not but the fact that copper content in every case exceeds 99.88 pct establishes them as commercially-pure metals. The descriptive terms denote the characteristics imparted to these alloys by the processing methods.

Add Zinc—The addition of zinc to copper sets up another group of alloys. But even these alloys, now called brasses, can be separated into two categories—the low-zinc brasses and high-zinc brasses. All low-zinc brasses (containing less than 37 pct zinc) are in the "alpha" group. Their chief claim to usefulness is their excellent cold-working properties. Rolling, pressing or drawing of these alloys increases their hardness. In fact, it's the most practical way to achieve hardness in an alpha brass.

The high-zinc brasses (containing more than 37 pct zinc) are in the "beta" group. These brasses, unlike the low-zinc brasses, have excellent hot-working properties but fall far short on cold working. Their tensile strength is fairly high and their hardness good.

New Family — By adding from ½ to 3 pct lead to the copper-zinc alloys, machinability improves greatly. This forms the third important group of alloys. The lead doesn't enter into solution with the alloy but disperses itself throughout the alloy in tiny particles. In machining, the metal being removed breaks off in small chips which free themselves easily from the tool and thus prevent fouling.

The leaded brasses are only slightly less malleable and ductile than the zinc brasses. Their cold working properties are poor, with workability decreasing as lead content increases. Yet, they can be extruded or hot rolled just as easily as the plain brasses.

Another important group benefits from small additions (up to 1 pct) of tin. As to physical and mechanical properties, this group matches the plain brasses. But in corrosion resistance, the tin brasses excel, making them exceptionally good alloys for marine use.

Among the copper alloys, the phosphor bronzes depart almost

to Copper's Assets

entirely from zinc as an alloying element. Instead, tin and small additions of phosphorous give this group characteristics of its own. These alloys have high tensile strength, high fatigue resistance and serve very well where shock, wear and abrasion are problems. When combined with their other assets, the phosphor bronzes come close to being considered "all-around" alloys.

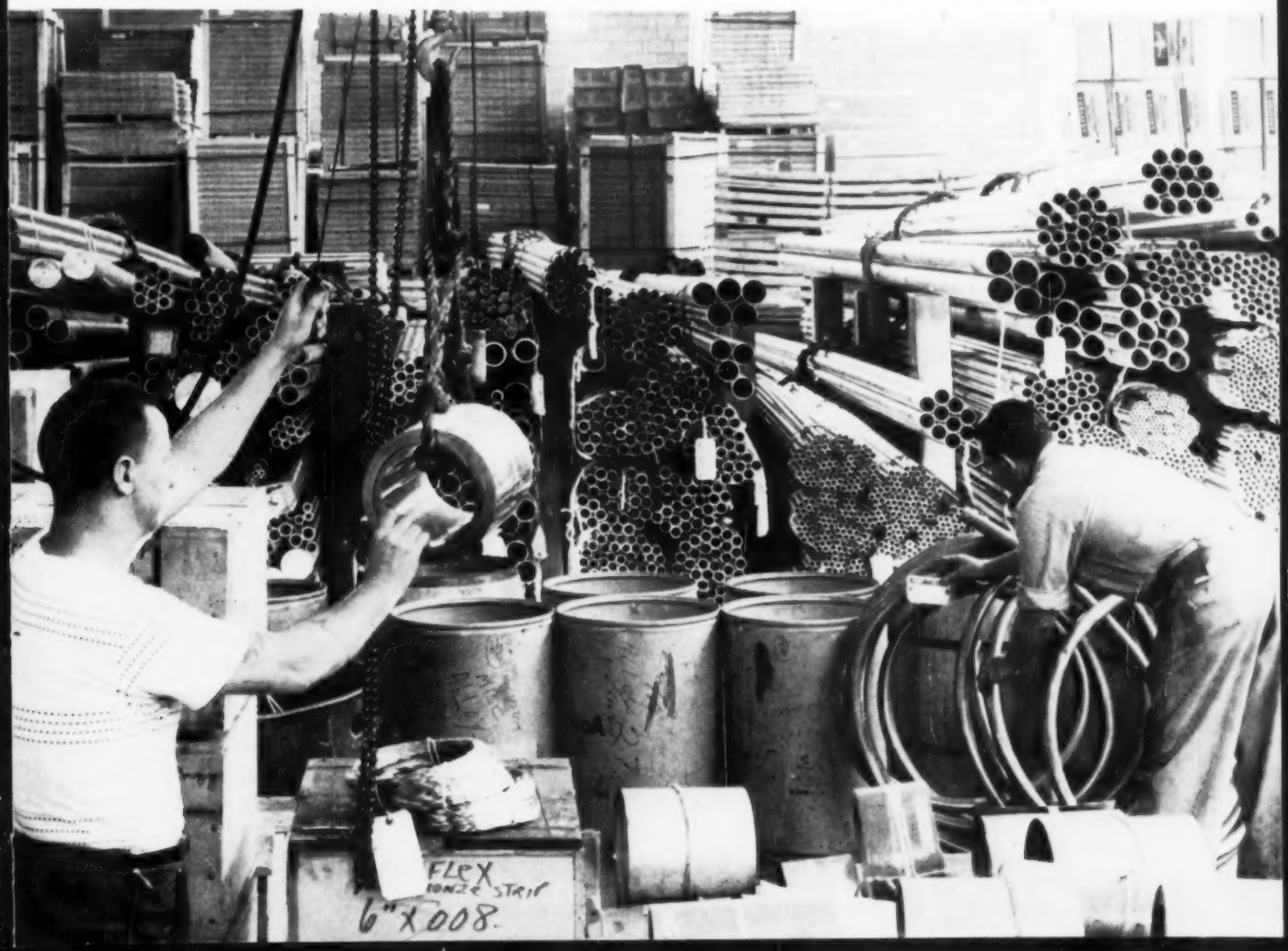
Substitution of nickel for some zinc in a plain brass results in still another distinctive group of alloys. They're called the nickel silvers because of their close color resemblance to silver. They're tough, highly malleable and ductile and are very resistant to corrosion and wear. When you combine these properties with their adaptability to plating and their good workability, these alloys stand out as the group of 1001 uses, both functional and decorative.

Where Toughness Counts — If you're searching for an alloy with the strength and toughness of mild steel, but with superior corrosion resistance, it'll pay to look closer at the silicon bronzes. They're readily weldable, you can work them both hot and cold, they have long endurance to fatigue and you don't have to heat treat parts before or after cold working because you can't over-work these alloys. You might consider them to be a "you-name-it-we-have-it" type. That's why they're used so widely where strength, toughness, corrosion resistance and ease of fabrication must work as a team.

Up to this point, you have seen how zinc, lead, tin, phosphorus, nickel and silicon have been alloyed with copper and thereby increasing its usefulness as an engineering material. But these are only a few of the more important alloying elements. Aluminum additions up to 12 pct improve the corrosion resistance of copper and give it extra strength. Aluminum also improves copper's resistance to scaling at high temperatures.

Easier To Work—Beryllium in the amount of about 2 pct changes the physical and mechanical properties of copper considerably. One of the greatest assets of this alloy

TUBES, SHEETS, COILS: Which size? Which temper? Which composition? It's a tough decision for users.



is that it can be worked in the soft annealed condition, then hardened by heat treating. Beryllium adds to the tensile and yield strength of copper and gives it fatigue and wear resistance much superior to that of the commercially-pure metal.

There are still other elements, such as cadmium, tellurium and manganese which alloy readily with copper. The fact that they do is important in itself, but even more important is the ability to acquire so vast an assortment of properties and characteristics in one family of alloys.

Will the wide range of properties make selection more complex rather than simplify it? Not at all, if you consider the alloys by groups and what the principle alloying elements were intended to do. Is electrical conductivity your prime requisite? If so, your selection will start with the commercially-pure coppers. If it's good machinability that you're after, the place to start is with the leaded brasses. For corrosion resistance in marine uses, it's the tin brasses. And for high strength and ease of fabrication, you'll want to check the silicon bronzes first.

A Look At Corrosion — Corrosion resistance ranks second only to the electrical conductivity of copper as a deciding factor in selection. The pull-out chart gives the rating for each alloy. What is it that gives copper and its alloys this generally excellent property?

Let's consider the corrosion process. Copper, because it is a noble metal, doesn't usually corrode by hydrogen evolution at the cathode as do other metals. Instead, oxygen is reduced to form hydroxide ions. The metal ions which go into solution at the anode unite with hydroxyl or other ions in the solutions to form metal hydroxides, oxides or salts. Many of these corrosion products form a tight film of low solubility over the copper. It's this phenomenon that helps copper to attain high corrosion resistance in the presence of so many substances. Obviously, if there's anything that destroys this film, corrosion will be hastened.

The fact that copper alloys have inherently good resistance to corrosion should not be construed to mean that they will serve well in all environments. Under certain conditions, they are subject to attack. Being cognizant of these conditions will help you to avoid the pitfuls by proper selection.

Zinc Leached Out—Dezincification, as the term implies, is a type of corrosive attack by which a brass alloy dissolves and the copper redeposits, but in a porous form. The zinc may be carried off in solution or deposited as an insoluble compound. Such attack may be either a local plug-type corrosion or a uniform layer-type. You'll find the plug-type attack where the conditions are alkaline, neutral or slightly acid. Layer-type dezincification usually occurs where the conditions are acid.

High temperature and low velocity of the corrosive areas only speed dezincification. Brasses with 15 pct or less zinc resist it quite well. Tin added to admiralty and naval brass also helps to reduce this type of corrosion in marine applications. Arsenic is even more effective when added in the amount of about 0.04 pct to admiralty and aluminum brass. However, it doesn't inhibit the beta phase and therefore is not used for the alpha-beta brasses.

Pitting is another form of attack attributed to strong anodic areas. This type of corrosion is local, but fast, resulting in deep cavities surrounded by sound metal. One way it starts is by the formation of an oxygen concentration cell under deposits of foreign matter or corrosion products. The area under a deposit, being shielded from oxygen or air, becomes anodic and is subject to attack. The area rich in oxygen, being cathodic, is protected.

Combined Attack—Impingement corrosion is another type of pitting and may be more aptly described as a corrosion-erosion attack. It's caused by the fast flow of solution over the metal surface which prevents the protective film from forming.

Stress-corrosion cracking results from the combined effects of localized stress and corrosion. With copper alloys, moist ammonia is the agent which causes the damage. And the ammonia need not come from leaky equipment. If the other conditions are right for stress-corrosion cracking, only a slight amount of ammonia from the decomposition of organic matter can start the attack. All copper alloys are subject to this form of corrosion, but the alloys containing more than 15 pct zinc are more susceptible to it.

Corrosion fatigue is still another type of failure. It's caused by the combined action of cyclic stresses and corrosion which result in transcrystalline cracks. They frequently start at pits which act as stress raisers.

Coupling of dissimilar metals in the presence of an electrolyte can cause galvanic corrosion. This is just as true of copper alloys as it is of other metals. Generally, this type of corrosion doesn't occur, or at least not to excess, when copper alloys are coupled to each other. However, the positions of the metals in the electromotive series should not serve as a barometer as to how the metals will behave in service. Other factors in the environment must be considered.

Drawing The Line — Oxidizing acids such as nitric and chromic are particularly harmful to copper alloys. Brasses with less than 15 pct zinc are used for many acids, but the high-zinc brasses should be avoided because dezincification may corrode the part in short order.

Copper, red brass, phosphor bronze, cupro nickel, aluminum bronze and the copper-silicon alloys hold up well against hot and cold dilute sulphuric acid and cold concentrated sulphur acid. At times, intermediate concentrations are

more corrosive than either the dilute or concentrated acids. Breakdown of concentrated sulphuric acid at elevated temperatures may also lead to corrosive attack in copper alloys.

The resistance of many copper alloys to concentrated hydrochloric acid at room temperature is fair. The corrosion rate increases when the acid is at elevated temperatures. Where a copper alloy is desired for handling hydrochloric acid, consider the same alloys that are offered for sulphuric acid.

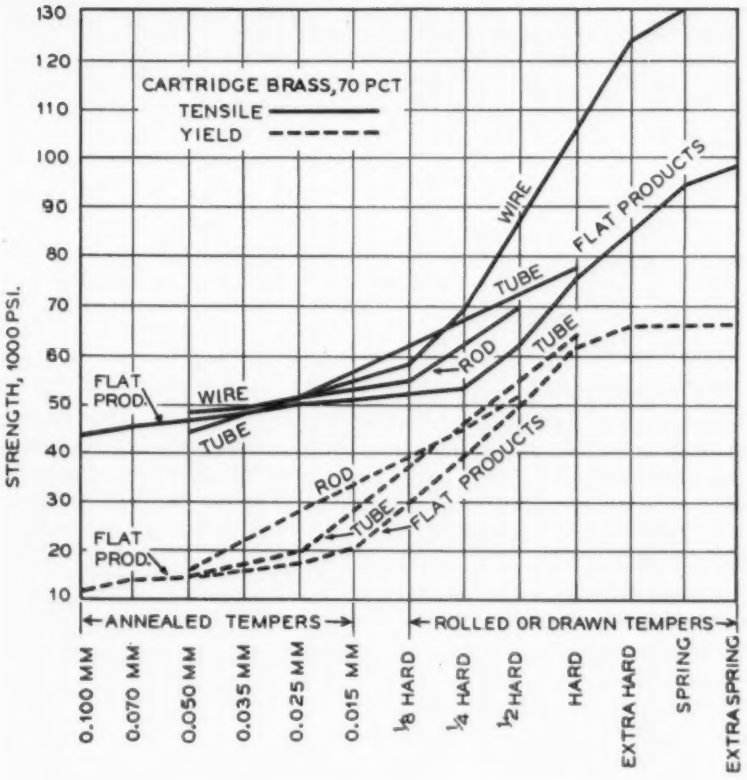
As for acetic acid, copper, phosphor bronze and copper-silicon alloys have proved satisfactory in service for some time.

Problem With Ammonia — Dry ammonia doesn't corrode copper alloys, but moist ammonia and ammonium hydroxide solutions will corrode them quite rapidly. In the presence of moisture and air, ammonia will cause stress-corrosion cracking in certain alloys, particularly those containing more than 15 pct zinc. One of the best alloys to combat the corrosive effects of moist ammonia at room temperature is the 70-30 cupro nickel.

Most copper alloys resist hot dilute alkalies. Many can handle any concentration of sodium and potassium hydroxide solutions at room temperature. However, avoid using the binary alloys containing more than 15 pct zinc for alkalies because dezincification corrosion might occur. The best bet is again the 70-30 cupro nickel.

Acting very much like the hydroxides, but less corrosive, are the alkaline salts such as sodium carbonate, sodium phosphate and sodium silicate. Most copper alloys pose no problem in handling neutral salt solutions, but the brasses with more than 15 pct zinc should not be used, again because dezincification may occur. Copper alloys are affected more by the chlorides than by the sulphates, and they are not at all suitable for mercury and solutions of its salts.

Acid salts, and many metal salts, can be highly corrosive to copper



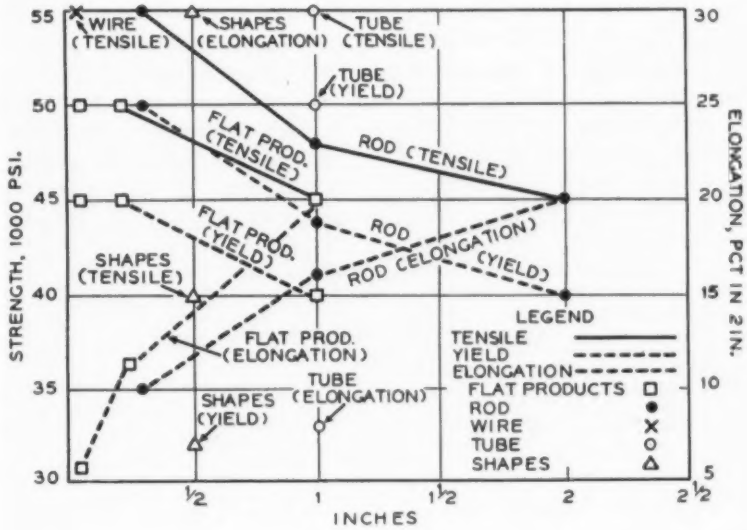


FIG. 1 (Top) Tensile and yield strength vary with the temper, form and size of a copper-alloy product. Chart shows this relationship as it applies to cartridge brass.

FIG. 2 (Bottom) Even the basic shape of a copper alloy has an effect on its characteristics. The chart shows this effect on electrolytic tough pitch copper.

alloys. The same holds for compounds with oxidizing properties such as ferric chloride and ferric sulphate. The chromates are noncorrosive in neutral and alkaline solutions but very corrosive in acids. Copper and high-copper alloys are subject to attack by sulphides more readily than some brasses and bronzes.

Harm In Moisture—Dry gases at room temperature or lower can be handled by copper alloys without being attacked. Moist gases react quite differently. Chlorine, when moist, will attack all copper alloys. Moist carbon dioxide will attack the high-zinc brasses but not the other alloys. And sulphur dioxide and sulphur trioxide form sulphurous and sulphuric acids in the presence of moisture. Alloys with more than 65 pct copper should not be used for handling moist acetylene under pressure. They form an explosive compound. To do otherwise is simply taking an unnecessary risk.

Copper alloys resist most organic compounds. Some of these include the acetates, alcohols, ketones, petroleum solvents and ether. Compounds such as carbon tetrachloride and trichlorethylene, at their boiling points and with moisture present, will attack copper alloys unless these hydrocarbons are stabilized.

Watch Other Factors—Corrosion resistance may be one of the key reasons for selecting a particular alloy but it's the rare case that selection will be based solely on any single property. Physical or mechanical properties may be just as essential, or perhaps more so, than corrosion resistance. Keep in mind that you're seeking the best combination of properties.

If physical properties weigh heavily in selecting an alloy, your job is simplified considerably. The values listed in the pull-out chart are constants and the alloy either has or doesn't have the properties you may require.

Selection based on mechanical properties isn't as easy. You must consider the "condition" of the alloy—the temper, hardness, form and size. Each of these conditions affects mechanical properties. Fig. 1, for example, shows how the mechanical properties of cartridge brass vary with different forms and tempers. Fig. 2 also shows the effects of size and form on the strength of electrolytic tough pitch copper of hard temper. Since it would be virtually impossible to list the mechanical properties for all the alloys under all conditions, the pull-out chart shows only the average values for hard (rolled or drawn) and soft (annealed) tempers.

Word About Tempers — The term "temper" connotes a meaning quite different from that when you're talking about steel. Here, it means the condition of the metal as to its mechanical properties brought about by cold working, annealing, or both. Temper is usually increased by cold working and decreased by annealing. An increase in temper implies an increase in hardness and toughness; a decrease signifies that the metal is softer, more workable.

It's common practice to classify annealed tempers by grain size. In annealing, the higher the temperature, the larger the grain size—and the softer the metal becomes. Smaller grain sizes are relatively harder. The annealed tempers with respect to grain size follow.

Average Grain Size, mm	0.015
	0.025
	0.035
	0.050
	0.070
	0.120

Rolled tempers are usually expressed as hard, half-hard, etc. Some refer to the nominal percentage of reduction in thickness attained to produce these tempers. The following are the standard tempers and degree of reduction:

Rolled Tempers

Designation	Nominal Reduction in Thickness, in.
Quarter Hard	11
Half Hard	21
Three Quarter Hard	29
Hard	37
Extra Hard	50
Spring	60
Extra Spring	68

Which Finish? — When you're thinking about selection, keep in mind that ordering material with the correct finish from the mill can often save you time and expense later. Unless you already have a setup for fast handling, your products require special finishing, or you're making assemblies where pre-finishing is not advisable, it may pay you to look into this aspect.

Thus far, the factors considered for selection have been limited to those which in some way affect or bear on the service requirements of the end product. But can the alloy you have in mind as the best from the standpoint of its physical or mechanical properties be worked by the processes most suitable to turn out the end product? Are you equipped for it?

As a further guide in the selection of a suitable alloy, the pull-out chart lists the relative ratings for cold working, hot working, machining and joining the standard copper alloys. Although they're not intended to be a precise measure of workability, they do indicate what you, as a user, should expect from an alloy. In addition to the fabrication properties, the chart also lists the processes which are commonly used to work the various alloys.

The same general rules apply to the selection of casting alloys. The table on opposite page lists eight basic groups, each including a few widely used alloys. Others are equally important.

Copper-Base Casting Alloys and Their Properties

ALLOY	Nominal Composition, pct									Tensile strength, 1000 psi	Yield strength, 1000 psi	Elongation, % in 2 in.	Modulus of elasticity[1]	Hardness Bhn[2]	Compression strength, 1000 psi		Impact strength, (Izod) ft-lb	Specific gravity	Weight, lb/cu. in.	Patternmakers' shrinkage, in./ft	Electrical conductivity[3]	Thermal conductivity, % of Cu	Melting point, °F	Solidification range, °F	Pouring temperature, (light castings) °F	Pouring temperature, (heavy castings) °F
	Cu	Sn	Pb	Zn	Al	Fe	Si	Mn	Ni						0.001 in. set	0.1 in. set										
TIN BRONZES																										
88-10-2	88	10		2						40-50	20-25	20-35	10-12	60-75	14-16	40-45	8-16			5/16	10-12	12-13	1800-1830	1570-1850	2100-2300	1920-2100
88-8-4 (G Metal)	88	8		4						47-51.5										5/16	14-16	12-13	1800-1830	1570-1850	2100-2300	1920-2100
87-8-1-4 (PC Metal)	87	8	1	4						36-43	16-24	18-30	10-12	60-75	9-11	32-38	9-15	8.70-8.87	.314-.320	5/16-3/8	10-12	12-13	1800-1830	1570-1850	2100-2300	1920-2100
87-10-1-2	87	10	1	2						38-46	18-26	15-25	10-12	65-80	12-14	40-46	12-15	8.70-8.87	.314-.320	5/16-3/8	10-12	12-13	1800-1830	1570-1850	2100-2300	1920-2100
88-6-2-4 (M Metal)	88	6	2	4						36-48	16-21	25-40	10-12	60-72	12-15	30-38	9-12	8.60-8.80	.314-.320	5/16-3/8	13-15	12-13	1800-1830	1570-1850	2100-2300	1920-2100
RED AND SEMI-RED BRASSES																										
85-5-5-5	85	5	5	5						32-43	15-24	20-35	9-14	55-65	10-12	30-33	6-12	8.7-8.8	.314-.321	5/16	13-16	16	1810-1840	1650-1830	2100-2350	1950-2150
81-3-7-9	81	3	7	9						29-39	13-17	18-30	8-14	50-60			6-10	8.6-8.8	.311-.318	5/16	18		1750-1800		2100-2300	1950-2150
78-3-6-15	78	3	6	15						27-37	12-16	15-30	8-14	50-60	8-10	29-32		8.55-8.7	.309-.314	5/16			1725-1775		2100-2300	1950-2150
HIGH-LEADED TIN BRONZES																										
80-10-10	80	10	10							27-37	15-22	8-12	8-13	55-70	12-16	40-47	2-8	8.7-8.8	.321-.329	1/16-5/16	7-12	12	1760-1770		2000-2250	1850-2100
83-7-7-3	83	7	7	3						30-38	17-21	12-20	13-15	55-65	14-16		3-6	8.85-8.95	.320-.322	5/16-3/8	10-14		1750-1800		2000-2250	1900-2050
78-7-15	78	7	15							25-33	14-20	10-18	8-12	50-60	13-16	38-48	4-6	9.1-9.4	.329-.340	5/16			1700-1750		2000-2250	1900-2100
70-5-25	70	5	25							23-30	11-15	7-16	8-12	42-55	12-14	22-25	4-6	9.2-9.5	.332-.343	5/16			1650-1760		2000-2200	1850-2000
LEADED YELLOW BRASSES																										
High-Copper Yellow Brass (400)	71	1	3	25						35-40	12-14	25-40	11-14	40-55	8-10	28-32		8.45-8.55	.305-.309	5/16-3/8	15-22	20-30	1700-1750		1950-2150	1800-2000
No. 1 Yellow Brass (403)	67	1	3	29						30-38	11-15	20-35	12-14	40-60	9-10	28-32		8.4-8.5	.303-.307	5/16-3/8	18-25		1700-1725		1900-2050	1750-1900
Low-Copper Yellow Brass (405)	60	1	1	37	0.25					40-48	14-20	15-25	13-15	50-75				8.30-8.47	.300-.306	5/16-3/8	20-24		1675-1725	1660-2000	1900-2000	1750-1900
MANGANESE BRONZES																										
Low Tensile	58			39	1	1		1		65-80	28-40	20-35	13-15	90-120	22-26	85-90	20-40	8.0-8.5	.289-.307	5/16-3/8	16-20		1690	1660-1700	1900-2000	1750-1900
Medium Tensile	66			23	5	3		3		90-100	45-55	16-30	13-15	180-200	22-26	85-90	10-20	8.0-8.5	.289-.307	5/16-3/8	12-14				1900-2000	1800
High Tensile	62			25.5	6	3		3.5		110-120	65-90	12-20	15-17	170-225	55-65	90-120	7-12	7.7-8.0	.278-.289	5/16-1/4	10-14	12-14			1950-2150	1800-1950
SILICON BRONZES AND BRASSES																										
Herculoy	91.5	0.5		4			4			45-65	20-35	15-40	14-16	65-90				8.4-8.6	.306-.310	5/16	6				2100-2250	1900-2050
Everdur 1000	95						4	1		45-55	17-25	20-50	14-16	80				8.20-8.25	.290-.300	5/16	5.6	16	1832		2100-2250	1875-2050
Tombasil	82			14			4			50-65	25-35	15-25	14.5-16.5	125-160				8.25-8.35	.300-.305	3/16-5/16			1600-1650		2000-2200	1850-2050
ALUMINUM BRONZES																										
89-1-10—(As cast)	89				10	1				60-75	25-30	15-25	14-16	100-140	16-20	75-83	18-30	7.3-7.65	.264-.276	5/16-3/8	12-15	14-15			2050-2200	1950-2100
—(Heat treated)										80-95	40-50	9-16		160-225	35-45		16-23				13.8					
86-4-10—(As cast)	86				10	4				75-95	30-41	12-15	15-17				10-18	7.52	.272	5/16-3/8	12	15	1680-1900	1650-1910	2200-2350	2000-2150
—(Heat treated)										90-110	40-50	5-15	15-17				20					15				
82-4-10-4—(As cast)	82				10	4			4	95*	45*	7*	17*													
—(Heat treated)										115*	70*	5*	17*													
NICKEL SILVER																										
18 Pct Nickel Silver	58	3	5	16					18	35-55	17-28	15-30		65-100				8.8-8.9	.318-.322	3/16	5-6				2250-2450	2050-2250

Notes: [1]—× 10^{-6} psi. [2]—10 mm ball, 500 kg load. [3]—Pct of annealed Cu at 20°C. *—Minimum.

Table compiled from data by Federated Metals Div., American Smelting and Refining Co.

Ways to Make Copper and Brass Pay Off

Copper and brass are readily workable by many processes. But don't let the term "readily workable" fool you. There are right ways and wrong ways of working these metals.

Work them to their best advantage and you'll be among those with a quality product and money in your pocket.

Neglect the helpful hints and you'll wind up with a scrap pile full of wonderful properties.

Machining

■ Machining the brasses and other copper alloys is fairly simple. So says the fellow who machines these materials day in and day out. After all, his machines are geared for top efficiency on high-production items and there's no reason to expect anything short of it. He has lived with the copper alloys long enough to know their behavior pattern under all conditions.

Then there's the other fellow who has only dabbled with copper alloys occasionally. Few if any of his products have called for copper, and the complexity of the copper alloys as a group has him stumped. He faces this same challenge with every design change, with every change in the fabricating method, with every switch from one alloy to another. He hasn't learned yet that they can be like so much "putty in his hands" if they're given a chance in those areas where they excel.

Generally speaking, one of these areas is machinability. The brasses, compared to other metals, are hard to beat. Yet, this essential property is difficult to define and more difficult to measure with any degree of accuracy. But by classifying the copper alloys into three machinability groups, it is possible to come within a broad range of speeds, feeds, rake and clearance angles.

Start With the Easiest—Free-cutting brass, an alloy containing 61.5 pct Cu, 35.5 pct Zn and 3 pct Pb, is the best of the alloys for machinability. Its rating, therefore, has been set at 100 which sets the standard for comparing the machinability of other copper alloys. Of the three machinability groups, Group 1 takes in those alloys with ratings from 70 to 100; Group 2 includes the alloys rated from 30 to 70; and Group 3 alloys have a rating of 30.

In rating the various alloys, five important factors were considered —speed, tool wear, finish, accuracy and the amount of power required. The ratings for the standard commercial wrought alloys are listed in the pull-out chart at the end of this feature.

So many variables enter into the machining picture that the number of possible combinations for removing a certain amount of metal in a given time is almost without end. For the wrought alloys, it's usually best to use the highest practical cutting speed, a rather light feed and a moderate depth of cut.

The reverse is generally true for castings where carbon or high-speed steel tools are used. Low turning speeds and coarse feeds will help to stretch tool life but you need not reduce speeds if you're using carbide tooling.

Which Tooling Material? — On short runs, you may be able to save a little on tooling cost by using carbon steel rather than some of the higher-priced materials. They will do a fine machining job, but they're apt to lose their hardness unless you're willing to limit yourself to lower speeds.

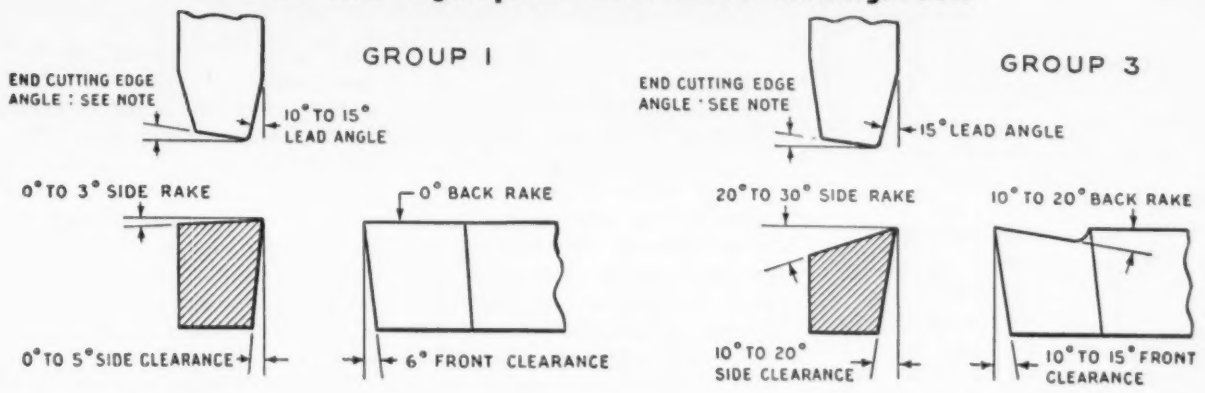
The common material for moderate production rates is a high-speed steel. The extra first cost over carbon steel on a lathe turning tool, for example, is more than justified by the increased machining speeds.

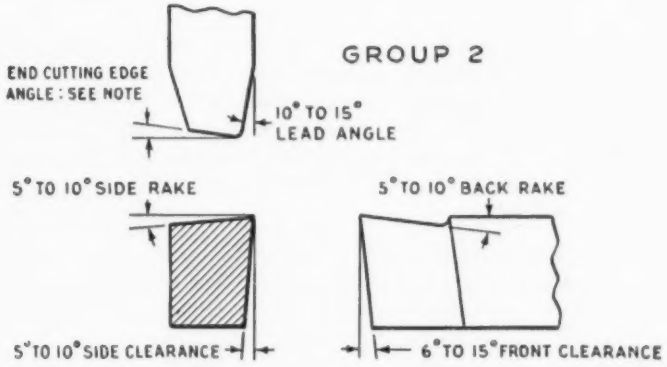
Long production runs usually call for tungsten-carbide tipped tools. These are particularly advantageous, and more economical, on castings, large-diameter work and other jobs where the metal removal rates are high. Not only do they stand up well under heat and abrasion, but their cutting speeds are much greater than for high-speed steels. Because they do wear so well, you can expect to keep machining tolerances much closer and get better finishes on the long-run jobs. Of course, there's also less down-time for setting up and tool grinding.

For Tougher Jobs—A big factor in favor of using carbide tips is their ability to be applied to a broad range of work. Perhaps even more important is the fact that they can often get you out of a tight spot on jobs which raise havoc with other types of tooling.

Cutting speeds and feeds in turn-

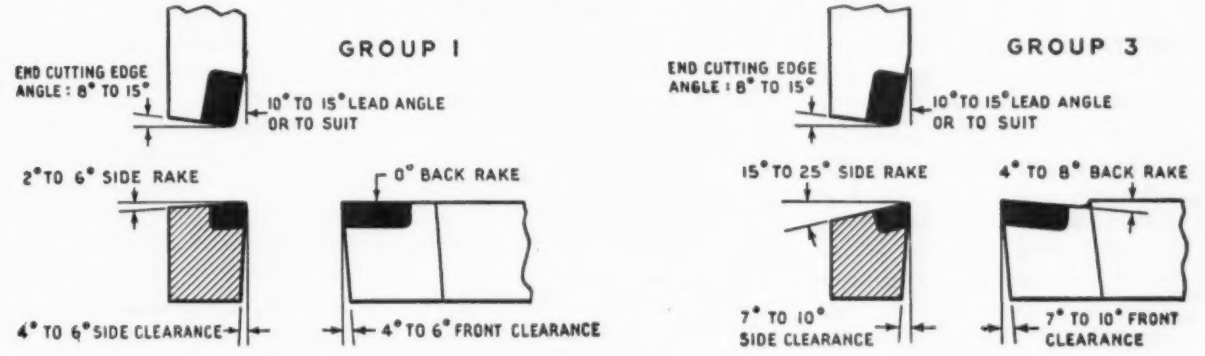
Carbon and High-Speed Steel Lathe Turning Tools

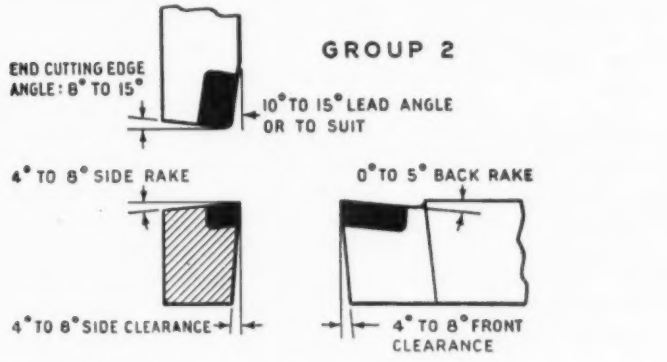

GROUP 1
END CUTTING EDGE ANGLE : SEE NOTE
10° TO 15° LEAD ANGLE
0° TO 3° SIDE RAKE
0° BACK RAKE
0° TO 5° SIDE CLEARANCE
6° FRONT CLEARANCE
GROUP 3
END CUTTING EDGE ANGLE : SEE NOTE
15° LEAD ANGLE
20° TO 30° SIDE RAKE
10° TO 20° BACK RAKE
10° TO 20° SIDE CLEARANCE
10° TO 15° FRONT CLEARANCE


GROUP 2
END CUTTING EDGE ANGLE : SEE NOTE
10° TO 15° LEAD ANGLE
5° TO 10° SIDE RAKE
5° TO 10° BACK RAKE
5° TO 10° SIDE CLEARANCE
6° TO 15° FRONT CLEARANCE

Rake angles are based on the tool shank being in line with center line of work. Placing it above or below center will change the effective rake angle. If the tool is not set up in its proper position, the rake angles should be ground so that it could be used in correct relation to the work.

Carbide-Tipped Lathe Turning Tools


GROUP 1
END CUTTING EDGE ANGLE : 8° TO 15°
10° TO 15° LEAD ANGLE OR TO SUIT
2° TO 6° SIDE RAKE
0° BACK RAKE
4° TO 6° SIDE CLEARANCE
4° TO 6° FRONT CLEARANCE
GROUP 3
END CUTTING EDGE ANGLE : 8° TO 15°
10° TO 15° LEAD ANGLE OR TO SUIT
15° TO 25° SIDE RAKE
4° TO 8° BACK RAKE
7° TO 10° SIDE CLEARANCE
7° TO 10° FRONT CLEARANCE


GROUP 2
END CUTTING EDGE ANGLE : 8° TO 15°
10° TO 15° LEAD ANGLE OR TO SUIT
4° TO 8° SIDE RAKE
0° TO 5° BACK RAKE
4° TO 8° SIDE CLEARANCE
4° TO 8° FRONT CLEARANCE

An 8° to 15° end-cutting angle should be satisfactory for most rough and finish turning. When the cutting edge of a finishing tool is ground with a drag, much heavier feeds can be used on light cuts. Rake angles are based on the tool shank being in line with the center line of the work.

Drill Point and Clearance Angles

ing operations will vary all over the lot depending on the material to be cut, machine rigidity, work-piece diameter, tolerances and other factors. But it's not unusual to use roughing cuts of ¼ in. or more, and still get a good finish.

In milling, you can use maximum speed on free-cutting brass and high speed for other alloys. Avoid using a cutter with too few teeth per inch. Cutters with four to eight teeth per inch serve best on copper alloys. If the cuts are heavy, consider using cutters with cemented-carbide inserts. Spiral cutters do a fine job on wide cuts.

No Coolant Needed—You won't need any coolant or lubricant for milling the leaded brasses if you don't use too high a speed or too heavy a cut. However, this doesn't apply to alloys with a machinability rating of 70 or less. For these alloys, you'll also need a positive rake angle to curl the chip. And be sure the cutting edges and sides of the cutter are smooth so that you avoid "plating" or "loading" action.

Drilling, for the most part, can be done with standard twist drills. In some cases, though, the job can be done a little more efficiently with straight-fluted, spiral or gun drills. Unless your production is high, you won't need a special drill material for alloys in the 70-100 machinability rating group. However, it will help if you reduce the web thickness at the point. Drills for alloys with a rating of 20 will perform better if you notch the cutting edge so it can split the chips.

Keep Chips Coming—You can sometimes get away with drilling the alloys in Group 1 without using a lubricant. But if it's possible to use a lubricant, it's advisable to do so. If the alloy is rated 70 or less, use of a lubricant is a must. Keep the drill cutting as long as the chips keep coming out. And don't go deeper than five times the drill diameter before clearing the hole of chips when you're using standard twist drills.

For tapping and chasing, be sure to use the proper coolant and tap for the copper alloy that you're machining. Most conditions call for a three- or four-fluted tap, the latter being preferable. There's some advantage in having more flutes on work with a thin wall and large diameter. However, you will get better chip clearance on coarse threads with a two-fluted chip driver. It will also give you smoother threads.

Allowing the chips to build up around the tool only results in rough threads and unnecessary tool breakage. Let the cutting compound wash away the chips after every operation. Taps won't need a rake on alloys with a rating of 70 to 100, but they should be sharp and hooked for alloys rated at 20.

Save on Sawing—It isn't too difficult to trim costs on the every-day sawing jobs. All that's required is to study each aspect that is likely to affect performance. Among the more important things to watch are saw width, number of teeth, pressure, feed and speed. And don't overlook the condition of the machine itself.

It's vital that you keep the blade under proper tension. Too loose a blade merely results in crooked cuts, buckling, twisting and stripped teeth. On the other hand, a blade that's too tight will snap easily and place too much load on the machine.

As for the teeth, coarse teeth are better for soft or thick material whereas fine teeth do a better job on hard alloys and thin sections. It's important, too, that they be set correctly. If the set is worn too much, you'll get crooked cuts and early blade failure.

Role of Coolants—Copper-base alloys need a good supply of coolant-lubricant when they're being machined. It does three jobs: (1) cools the work and the tool, (2) lubricates and (3) removes the chips. For the sake of keeping dimensional accuracy and getting a good finish, it's important that the heat generated by the plastic flow of metal and by the friction of chips on the tool be carried away. The faster, the better.

For the coolant to be most effective, it must be directed to the point where the cutting tool and work come in contact. If the chips block the flow of coolant, use two, or as many as necessary, high-velocity jets.

The leaded brasses and other alloys in the 70-100 machinability group need the cooling more so than the lubrication. However, a low-viscosity mineral oil also gives excellent results. Higher speeds and deeper cuts have been obtained from automatic screw machines through the use of soluble cutting oils. A 20:1 water-oil mixture is satisfactory.

Add Lard Oil—The low-viscosity mineral oil can be used on alloys in the 30 to 60 machinability group but lubrication will improve by adding 5 pct lard oil.

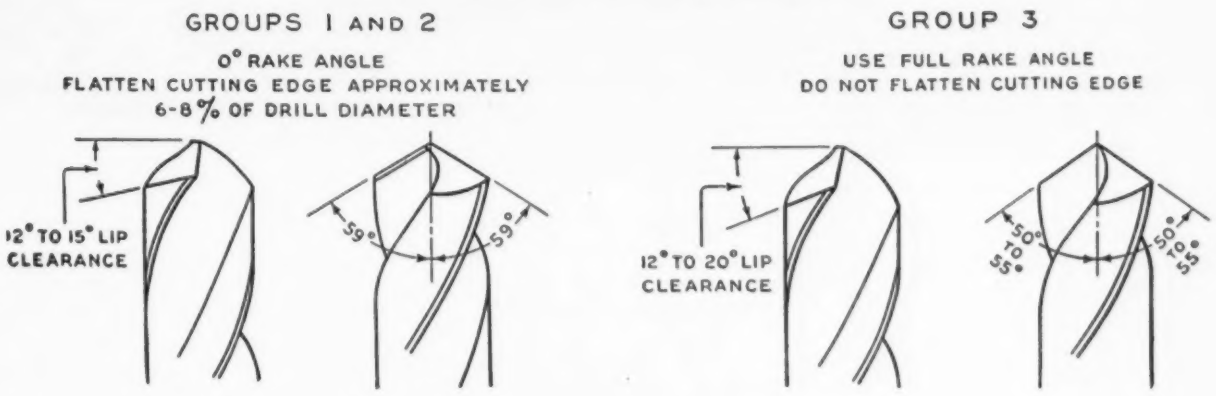
Because of the tougher alloys in the group rated at 20, there's a tendency for them to "weld" to the tool. Sulphurized mineral oil with 10 to 20 pct lard oil helps to avoid this. Keep in mind that staining will occur when you use a sulphurized mineral oil.

The number of variables in any machining operation does not permit specific recommendations to be made concerning the best lubricant for each job. You should seek the advice of a manufacturer.

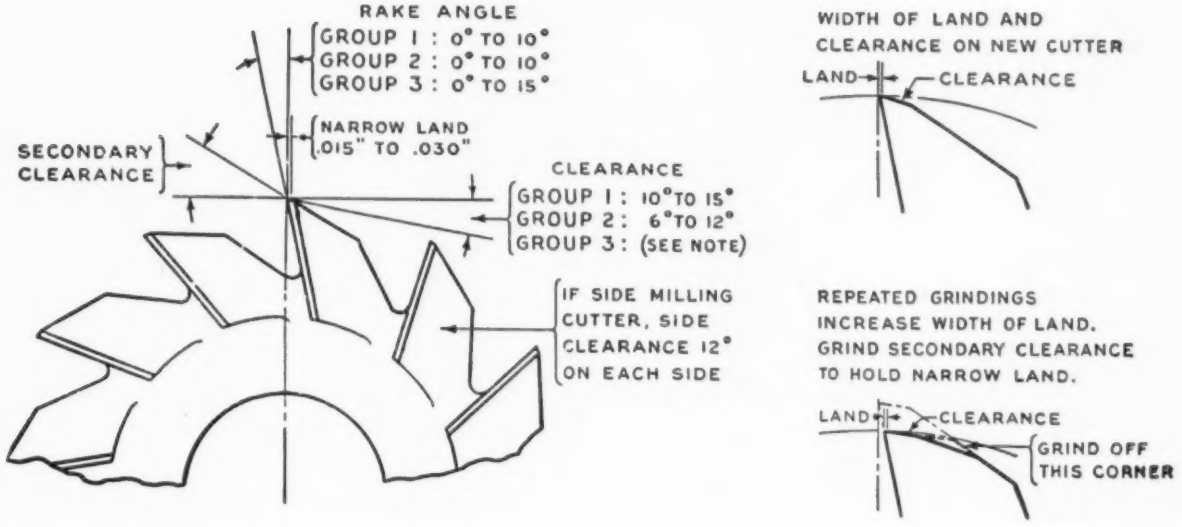
Secondary Operations — Where machinability weighs heavily as a factor in making a selection of material, free-cutting brass invariably gets the nod. But where do you draw the line when there's a secondary operation to be performed? And remember that it's the lead content in the alloy which for the most part controls machinability. But it also decreases ductility and makes the alloy more susceptible to fracture during severe cold working.

Sharply defined knurling is difficult to acquire on high-leaded brass by two different methods. You

Drill Point and Clearance Angles



Milling Cutter Rakes and Clearances


RAKE ANGLE
GROUP 1 : 0° TO 10°
GROUP 2 : 0° TO 10°
GROUP 3 : 0° TO 15°
SECONDARY CLEARANCE
NARROW LAND .015" TO .030"
CLEARANCE
GROUP 1 : 10° TO 15°
GROUP 2 : 6° TO 12°
GROUP 3 : (SEE NOTE)
IF SIDE MILLING CUTTER, SIDE CLEARANCE 12° ON EACH SIDE
WIDTH OF LAND AND CLEARANCE ON NEW CUTTER
LAND
CLEARANCE
REPEATED GRINDINGS INCREASE WIDTH OF LAND. GRIND SECONDARY CLEARANCE TO HOLD NARROW LAND.
LAND
CLEARANCE
GRIND OFF THIS CORNER

might stop here and ask yourself whether deep, clean knurling is necessary. Many knurling jobs are entirely satisfactory when done on a half-hard free-cutting brass. If this isn't satisfactory, one alternative is to select an alloy with less lead in it. Chances are that knurling will be easier and without having affected machinability to any great extent.

Similar problems exist with other secondary operations such as roll lettering, thread rolling, spinning and bending, but they can be resolved by using softer tempers or calling for alloys having less lead.

Some assembly operations run into the same difficulty. Staking and flaring, for example, require the workpieces to be reasonably ductile. In the case of staking, when there's no way to avoid using the leaded alloy, annealing sometimes becomes necessary.

When the amount of cold working is fairly large, you may have to resort to a lead-free alloy. But such a selection isn't easy since you would then be dealing with a new combination of properties which may not be entirely suitable for the end product.

Speeds and Feeds — Surface speeds for lathe turning of copper alloys can vary from 75 to 700 fpm. The actual speed will depend on the machinability rating of the alloy and the type of cut being taken. The more readily machinable alloys (Group 1) can be machined at speeds from 300 to 700 fpm with a roughing feed of 0.006 to 0.020 in. or a finishing feed of 0.003 to 0.015 in. For heavy work, speeds should be near the lower end of the scale. Since these approximations apply to high-speed steel cutters, the estimates for carbon steel cutters should be reduced by 50 pct.

The speeds for Group 2 alloys range from 150 to 300 fpm. The roughing feed will be somewhat heavier than for Group 1 alloys—0.015 to 0.035 in. The finishing feed is about the same, ranging from 0.005 to 0.015 in. For Group 3, surface speed is 75 to 150 fpm, with roughing feed from 0.015 to 0.040 in. and finishing feed from 0.005 to 0.020 in.

Continued

Forging

■ Forgings usually imply a certain quality in them that might not be found in products made by other means. They seem to carry a label of superiority through the properties they possess—something that's not to be confused with the general run of mass-produced items. There's some merit in thinking that copper and brass forgings have something special about them, but they too can be turned out in large quantities with modern presses.

Where do forgings fit into the picture for you as a potential user? As a purchaser, you probably won't be impressed by first-cost figures. But if you're buying them strictly on the basis of performance, the forging will sell itself. Both sides of this two-sided cost picture can take a lot of study.

Guide for Buying—There are a number of features in forgings which aren't always apparent at first glance. To say that they have good mechanical properties is stating the obvious. In forgings, you're buying quality right from the start. You're getting a product, too, that is already in a finished condition for many applications and semi-finished for many others. Where machining is necessary, it's usually only a small amount. Even for plating, the finish is frequently satisfactory without polishing or buffing. All of these factors bear directly or indirectly on the over-all cost.

BIG SQUEEZE: Press head descends on a piece of hot copper to shape it and improve its properties. Most forgings are made in closed dies.

The very nature of forging is such that close tolerances can be held with no difficulty. For the copper alloys, the forging method used most widely is called closed-die or impression-die forging. It involves pressing or squeezing a hot slug of metal between a set of dies to the exact shape of the desired forging. There's no pounding or hammering of the metal; pressing or squeezing is done in one continuous press stroke.

Economy in Dies — Considering the tremendous pressures, high temperatures and great stresses to which the dies are subjected, their design and the precision with which they are made are all-important factors. Nothing but high-grade tool steels or special alloy steels are used. After the cavities for the forging are cut, the dies undergo heat treatment and stress relief. The die blocks alone add up to considerable expense, not to mention the cost of a huge press.

It is possible, though, to save some of this expense by using a less expensive steel for the die blocks which back up the actual dies. This cost-cutting practice is common in die design.

Savings in Numbers — Another practice which helps to keep forging costs down is the use of a master die where one design makes forgings by the thousands. The master dies are not used for actual production, but from them are made the working dies as they are

needed. To get the necessary accuracy in the working dies, the master die must be finished to extremely close tolerances.

Slugs used in making the forgings are cut to proper size from rod or extruded shapes by shearing or sawing. By forging, the wrought slugs are formed into dense, fine-grained products with improved properties. Design engineers often capitalize on the superior properties of a forging by designing the part correspondingly lighter than would be necessary if the part was made by some other process.

Control Heat—The temperature to which slugs are heated prior to forging must be held to within reasonably close limits. Overheating will push the reject rate upward, causing poorly filled-out forgings, cold shuts, laps, folds and other faults. The temperature ranges within which hot working should be done are listed in the pull-out table. The table also lists those wrought copper alloys which are capable of being forged.

Can the inherent values in forging be translated into dollars saved? Many users have proved to themselves that it can be done. A manufacturer of food machinery did it on savings in the machining time on gears. First, he paid for less material since the forged blanks weighed about 35 pct less. The sharp cut in machining time enabled him to boost production without investing in any new equipment. He saved a third way by having eliminated rejects.

Eliminates Porosity — Use of brass forgings by a valve manufacturer not only eliminated a serious porosity problem, but saved him 15 pct on each unit in direct costs on materials and labor. The forgings proved so successful that he found it unnecessary to pressure test the valves. Inspection costs have also been reduced. Other benefits as better surface finish and compactness in design all added up to a more salable product.

Frequently, a manufacturer who has been bailed out of difficulty by

switching to a forging for one part will begin looking for other parts which can be converted. A manufacturer of commercial refrigerators did just that when he called for forged latches and hinges to resist corrosion. Before long, all threaded fittings were made from forgings. Because of the fine-grained, uniform structure in the forged fittings, he was able to get tighter joints and fewer troublesome leaks.

Point of No Return — In some cases, it seems bad enough to scrap a part before too much work goes into it. But on some parts, as much as 75 to 80 pct of the machining may be completed before internal voids are discovered. In one instance, this alone proved such a burden cost-wise that it tipped the scales in favor of forgings.

Techniques of forging have also improved, at least to the extent where forgings can now compete quite favorably on the basis of production costs alone.

Casting

■ Copper-base castings, like the wrought alloys, have combinations of properties which cannot be found in other types of castings. It's when two or more of these properties work together that the copper-base castings step out in front.

The important feature to foundrymen is that these alloys cast well. In terms of cost, it means that sound castings can be produced regularly without the need of special equipment and extensive technical background. Just good foundry practice will do.

The term "good" is relative and can be interpreted in many different ways. To the foundryman, it simply means recognizing the problems of casting copper-base alloys and being able to cope with them.

Three main problems seem to stand ready to plague foundrymen: (1) dissolution of gases, (2) creation of metal oxides and (3) control of metal temperature.

Causes Porosity—Almost without exception, the copper-base casting alloys will dissolve hydrogen. Only the zinc-rich alloys tend to flush out some of the hydrogen. In the molten state, these alloys dissolve more hydrogen than in the solid state. As a result, when the metal begins to freeze, it tries to rid itself of the hydrogen picked up during melting and creates a porous condition in the casting.

It's not a condition that can be wholly avoided but it is one that can be controlled. One way to do this is by melting the metal in a slightly oxidizing atmosphere in a gas- or oil-fired furnace. This minimizes the solution of hydrogen in the molten metal. However, with too much oxygen present, oxygen content in the metal may also be in excess. Therefore, it's necessary to use a deoxidizer before pouring.

To curb gas pickup, it's necessary to control and be consistent in your melting practice. Use clean, dry materials in the furnace, melt the metal quickly, and remove it from the furnace as soon as it reaches the right temperature.

Too Much Oxygen — During melting, some oxidation helps to control the solution of gases, but when there's excessive oxygen present, it combines with the molten metal to form unwanted oxides or dross.

Some copper-base casting alloys are affected by oxidation more than others. Also, oxidation is almost nil in a reducing atmosphere. It's during the oxidizing melting technique that careful control is needed. Some foundrymen use fluxes to pre-

vent oxide formation on the surface. But improper use of fluxes may exclude too much oxygen and permit hydrogen to build up.

Deoxidizers will help to reduce the amount of metal oxide in the bath except for silicon, manganese and aluminum bronze. But since oxides impair castability, add the deoxidizer right after the molten metal has been skimmed of dross.

Avoid Stirring—One of the worst practices is the stirring or agitating of the molten metal while it's in the furnace or on the foundry floor. This only mixes the oxide into the metal and results in a casting with a great amount of dross.

The third problem deals with the relationship between temperature and the amount of gas a copper-base casting alloy will pick up in the molten state. The higher the temperature, the more gas solution in the metal. Therefore, it's important to remove the metal from the furnace as soon as it reaches the lowest temperature at which it can be skimmed, deoxidized and still be poured at the proper temperature.

Good practice doesn't stop with melting. It must be carried on throughout the casting procedure. Keep the molten metal quiet at all times. To avoid dross through turbulent pouring, bring the lip of the crucible or ladle as close to the sprue as possible. Try to control the stream of metal during pouring so that it doesn't splash. It's also important to pour into the sprue without interruption.

Area to Watch—Improper gating and risering accounts for more than half of all defects in brass and bronze castings. So it's an area that's ripe for savings.

The idea behind a gating system is to fill the mold cavity completely so that the casting will be sound internally and free of flaws externally. For internal soundness, steps must be taken to control solidification shrinkage. External flaws can be avoided by designing the gating system so that you can pour the metal without turbulence or splashing.

When it comes to gating and risering, the copper-base casting alloys break conveniently into two groups—those that have a wide solidification range of 250°F or more, and those that solidify in less than the 250°F range.

With those metals in the wider range, solidification starts as a dense skin against the mold. The metal at the center of the casting stays molten. When it finally solidifies, shrinkage of the metal in the center section is apt to leave it porous.

That's where a good gating system has a job to do. It should be designed to allow the metal to enter the mold through as many gates as practical and should be distributed uniformly among the gates.

These are only a few major areas where tighter control over casting practice can pay dividends. Other faults, their causes, and corrective measures to overcome them are listed in the adjoining table.

Finishing

▪ Copper and copper alloys are noted for their natural attractive colors and appearance. Yet, some people want to improve them; others simply want to preserve them. But either way, it must be done correctly; otherwise you will accomplish neither.

In outdoor architectural uses, copper alloys should undergo periodic cleaning. But even after long exposure, proper treatment can easily restore its original color and luster.

Cleaning in Industry—The purpose for cleaning copper in a manufacturing process is quite different from that in architecture. Here, cleaning serves to remove all foreign matter to prepare the surface for subsequent final finishing. The soils to be removed are also quite different—ranging from soaps and heavy mineral oils to chips and tiny mineral particles. So the big problem is that of using effective cleaners and methods to remove all the dirt.

To say that the surface must be clean isn't enough. What's the purpose for cleaning? If the surface is to be mechanically clean, you'll remove all solid particles, grease, oil and certain oxidation products, but not necessarily the products of other chemical reactions. You can do this by barrel tumbling, scratch brushing, wheel or belt grinding, blast or vapor cleaning and acid pickling.

Then there's physical cleaning in which gross surface dirt is removed. For this purpose, mineral spirits, chlorinated hydrocarbons, and emulsifiable-type cleaners are commonly used. Cleaning is usually done by dipping or spraying with the solutions for a short time.

Chemical cleanness means freedom from all foreign matter including oil, grease, fingerprints, tarnish, chemical reaction products as well as surface-adsorbed gases. The alkaline cleaners are used for this purpose, and in fact are the only cleaners which will produce a chemically clean surface. It's required in preparation for plating, lacquering and enameling.

Copper alloys can be finished by almost any well-known process. In polishing and buffing, wheel speeds are important—6000 to 9000 sfpm for polishing and 4000 to 5000 sfpm for emery bobs. Ball burnishing gives the best finish on small, bulk-treated items. Among the other processes are electropolishing, electroplating, etching, organic finishing and coloring.

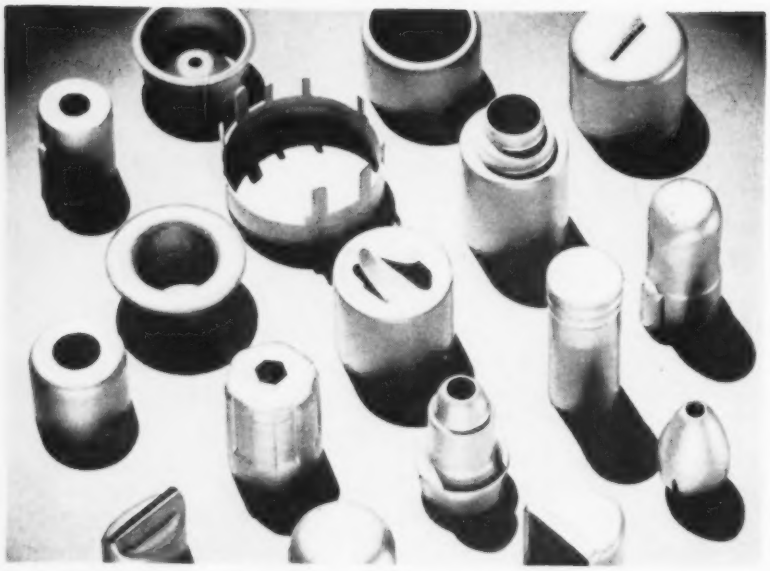
Continued

Trouble-Shooting Chart for Copper-Base Castings | Most Common Causes

PROBLEM	DESIGN	PATTERN EQUIPMENT	MOLD SETTING	GATING	MOLDING	MOLDING SAND	CORES	METAL	MELTING	POURING
SHRINKAGE CRACKS AND CAVITIES. Cracks or cavities formed by the metal pulling itself apart while cooling in the mold.	Adjacent position of heavy and light sections. Lack of fillets. (3)			Inadequate gating requiring excessive pouring temperature. Inadequate feeding of heavy sections. (1)						Too high or too low pouring temperatures. (2)
COLD SHUT. Lack of joining of metal where two streams meet, leaving a crack, or a weakness which may result in a crack.			Insufficient pouring head. (3)	Inadequate gating. Restriction in the gate or runner. (1)	Insufficient venting. (5)	Wet sand. Low permeability of sand. (4)		Metal sluggish due to contamination in charge or in furnace. Usually sulphur, oxygen or gas. (7)	Gas absorption. Sluggish metal. (6)	Metal too cold. Improper skimming allowing dross to enter sprue. (2)
WORMY SURFACE. Elongated depressions near the gate like worm tracks. Often filled with zinc oxide. Sometimes with fractures.				Inadequate gating. (1)		Inadequate venting and low permeability. (3)		Silicon or aluminum contamination of leaded alloys. Too much phosphorus in zinc alloys. (4)		Excessively high pouring temperature. (2)
SAND WASH. Rough lumps of metal at some points of casting and rough holes at other points.		Rough surface. Insufficient draft with weakening of sand on withdrawal. (4)		Weak areas of sand around gate. Sharp corners at gate. (1)	Too light ramming. (2)	Weak sand. (3)	Overbaked core. Poorly bonded core. Core-crush. (5)			
SCAB. Rough, slightly raised surface on casting often with sand imbedded.					Hand ramming. (1)	Sand too fine. Lack of permeability. (2)				
CORE BLOW. Smooth depression on inner surface of a cored casting or gas pocket above cored cavity.		Insufficient core print for venting. (3)			Inadequate venting from core print. (2)		Insufficient baking Moisture pickup after baking. (1)			
BURNING INTO SAND. Rough, sandy appearance of outer part of casting with sand imbedded.						Sand too coarse. Sand too dry. Sand of too high permeability. (2)		Excessive metal fluidity as from too much phosphorus. (1)		Excessive pouring temperature. (3)
WEAK OR DISCONTINUOUS STRUCTURE. Minute cavities or voids between large crystals. In bronze, badly discolored fractures, granular in appearance.	Heavy sections adjoining light sections. Cannot be adequately fed. (4)			Inadequate gating requiring high pouring temperature. Inadequate feeding of heavy sections. (1)					Gassing during melting. (2)	Excessive pouring temperature. (3)
BURNING INTO CORES. Rough appearance of inner part of casting with sand imbedded. Metal fins penetrating into core and holding grains of sand.							Overbaked cores. Too rapid baking of cores. Poorly bonded cores. Insufficient clay bond in core sand. (2)	Excessive fluidity as from too much phosphorus. (1)		Excessive pouring temperature. (3)
GAS HOLES. Holes under or near surface of casting. Inside of gas cavities untarnished.	Inadequate fillets on pattern or excessively thin sections requiring too high pouring temperature. (6)					Wet sand. Too much new sand in mix. (3)	Poorly dried or poorly vented cores. (4)	Metal contaminated with sulphur dioxide or hydrogen while charging. (5)	Gas absorption. Sulphur dioxide, hydrogen. (1)	Too high pouring temperature. (2)
TIN OR LEAD SWEAT. Spots, lumps, or a thin layer of white metal on the surface of the casting.								Silicon or aluminum contamination in charge. (2)	Absorption of reducing gases during melting or holding. Silicon or aluminum contamination during melting. (1)	Excessive pouring temperature and high phosphorus. (3)
MISRUN. An incompletely filled mold cavity. Lugs or corners not filled out. A smoothly rounded hole through wall of casting.			Insufficient height of sprue. (3)	Too small gate. (4)	Inadequate venting. (1)	Sand too wet. Low permeability of sand. (5)		Metal contaminated with sulphur dioxide, oxygen or hydrogen while melting. (7)	Metal gassed and made sluggish in melting. (6)	Interruption of pour. Too slow pouring. Too cold metal. (2)

Table courtesy Federated Metals Div., American Smelting and Refining Co.

Numbers indicate (1) Most common, etc.



FORMABILITY PLUS: These parts for the electrical and refrigeration industries are only a sample of how copper alloys can be formed.

Stamping

▪ Seven basic fabricating methods shape sheet copper and brass into every conceivable figure. Each group is distinct, but two or more basic methods are usually required to make even the simplest product.

Stamping falls into the group of squeezing operations of which embossing, swaging and forging, and coining are closely allied. For these operations, ductility is the essential property so that copper and non-leaded high-copper alloys are the most suitable. The leaded brasses, phosphor bronzes, naval brass and the like should be avoided for these processes.

Bring Back to Size — Stamping takes in those operations where a design or character is stamped into one surface of a blank. The important surfaces are confined, but some provision must be made for the metal to flow. Usually, stamping is followed by machining, shaving or trimming to bring the surface back to its original size.

The 65-pct copper nickel silvers and the cupro nickels are also suitable for stamping.

The same alloys are used for embossing, the process for forming a raised pattern on a blank by moving the metal in a set of matching dies. Both sides of the blank have the same final contour. In some cases the pattern is applied by passing strip through mating rolls on which the pattern is impressed.

Coining is the most severe of the squeezing operations. It's usually done in closed dies which restrict the flow of metal. The most common use is for producing coins and medals. Blanks for coining must be held to very close tolerances. Selection of the proper alloy and temper is critical and should be done with care.

The last process in this group is swaging. It doesn't change the volume of the part but it does change its shape. Some very complicated shapes can be produced by swaging, most often through a series of cold working operations. Because of the severity of the operation, only the coppers, brasses and 65-pct copper nickel silver are considered suitable enough for swaging. Other alloys can be used, but they require special techniques.

Joining

▪ Copper and its alloys are used in so many different ways that many joining methods must be brought into play. Some connections are made with very simple mechanical joints such as threaded male and female pieces. For sheet stock, various seams such as the flat-lock and standing seams form loose locks which allow for movement of metal due to contraction and expansion.

Solder is used for flat seams, adding strength and rigidity to the joint. It also acts as a seal. Where full strength is required, a plain lap joint can be soldered as well as riveted.

Solder Easily—With the exception of aluminum brass, all other copper alloys can be soldered without difficulty and with the usual solders.

For still greater joint strength and use at temperatures from 250° to 350°F, silver brazing alloys or copper-phosphorous brazing rods are commonly used.

Some of the alloys can be welded satisfactorily by various processes, but others rated as "fair" can be joined sufficiently well for certain applications.

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FABRICATING PROPERTIES									FABRICATING PROCESSES																				
		Joining Processes[9]																											
Cold Workability Rating[8]	Hot Workability Rating[8]	Soft Soldering	Brazing	Oxyacetylene Welding	Carbon Arc Welding	Gas Shielded Arc Welding	Metal Arc Welding	Resistance Welding	Blanking	Coining	Drawing	Etching	Forming	Heading	Hot Forging	Hot Forming	Hot Pressing	Knurling	Machining	Piercing	Punching	Roll Threading	Shearing	Spinning	Stamping	Swaging	Upsetting
E	E	E	G	NR	F	F	NR	NR	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x
E	E	E	E	G	F	G	NR	NR	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x
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G	NR	E	E	F	G	G	F	E	x		x		x										x		x			
G	NR	E	E	F	G	G	F	E	x				x										x					
E	G	E	E	F	G	G	F	F	x				x	x									x			x	x	
G		E	E	NR	F	G	F	F	x		x		x						x				x		x			
G	G	E	E	F	NR	E	E	G					x															
G	G	E	E	F	NR	E	G	G					x															
E	NR	E	E	G	NR	F	NR	E	x		x	x	x	x				x				x	x	x		x	x	
G	NR	E	E	G	F	F	NR	E	x				x										x					
E	NR	E	E	G	NR	F	NR	E	x		x	x	x	x				x				x	x	x		x	x	
E	NR	E	E	G	NR	F	NR	E	x		x	x	x	x				x				x	x	x		x	x	
E	NR	E	E	G	NR	F	NR	E	x		x	x	x	x				x				x	x	x		x	x	
E	E	E	E	G	E	E	F	E	x		x		x	x	x		x	x				x	x			x	x	
E	E	E	E	G	E	E	F	G					x	x	x		x	x				x				x	x	

[13] As hot rolled.
[14] Light anneal.
[15] As extruded.
[16] Light drawn.
[17] Estimated.

Reprints of this chart are available as long as the supply lasts. You may obtain a copy from Reader Service Dept., THE IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

Standard Commercial Wrought Copper An

	NOMINAL COMPOSITION, PCT			COMMON AVAILABLE FORMS[1]					PHYSICAL PROPERTIES							
	Cu	Zn	Others	Tube	Shapes	Rolled Flat Products	Rod and Drawn Flat Products	Wire (Except Flat)	Melting Point (Liquidus), °F	Melting Point (Solidus), °F	Density[2]	Specific Gravity	Coefficient of Thermal Expansion[3]	Thermal Conductivity[4]	Electrical Resistivity[5]	Electrical Conductivity[6]
Electrolytic Tough Pitch Copper	99.96		O 0.04	x	x	x	x	x	1981	1949	0.322	8.92	98	226	10.3	101
Deoxidized Copper	99.98		P 0.02	x	x	x	x		1981		0.323	8.94	98	196	12.2	85
Oxygen-Free Copper	99.92[10]			x	x	x	x	x	1981		0.322	8.94	98	226	10.3	101
Gilding, 95%	95	5				x		x	1950	1920	0.320	8.86	100	135	18.5	56
Commercial Bronze, 90%	90	10		x		x	x	x	1910	1870	0.318	8.80	102	109	23.5	44
Red Brass, 85%	85	15		x	x	x		x	1880	1810	0.316	8.75	104	92	28	37
Jewelry Bronze, 87.5%	87.5	12.5				x	x	x	1895	1840	0.317	8.78	103	100	26	40
Low Brass, 80%	80	20				x	x	x	1830	1770	0.313	8.67	106	81	32	32
Cartridge Brass, 70%	70	30		x		x	x	x	1750	1680	0.308	8.53	111	70	37	28
Yellow Brass	65	35				x	x	x	1710	1660	0.306	8.47	113	67	38	27
Muntz Metal	60	40		x		x	x		1660	1650	0.303	8.39	116	71	37	28
Leaded Commercial Bronze	89	9.25	Pb 1.75				x		1900	1850	0.319	8.83	102	104	25	42
Low-Leaded Brass (Tube)	66	33.5	Pb 0.5	x					1720	1660	0.307	8.50	112	67	40	26
Low-Leaded Brass	65	34.5	Pb 0.5			x			1700	1650	0.306	8.47	113	67	40	26
Medium-Leaded Brass	65	34	Pb 1		x	x	x	x	1700	1630	0.306	8.47	113	67	40	26
High-Leaded Brass (Tube)	66	32.4	Pb 1.6	x					1710	1650	0.308	8.53	113	67	40	26
High-Leaded Brass	65	33	Pb 2			x	x		1670	1630	0.306	8.47	113	67	40	26
Extra-High-Leaded Brass	63	34.5	Pb 2.5			x			1660	1630	0.307	8.50	114	67	40	26
Free-Cutting Brass	61.5	35.5	Pb 3		x		x		1650	1630	0.307	8.50	114	67	40	26
Leaded Muntz Metal	60	39.4	Pb 0.6			x			1650	1630	0.304	8.41	116	71	38	28
Free-Cutting Muntz Metal	60	39	Pb 1	x					1650	1630	0.304	8.41	116	69	38	27
Forging Brass	60	38	Pb 2		x		x		1640	1620	0.305	8.44	115	69	38	27
Architectural Bronze	57	40	Pb 3		x		x		1630	1610	0.306	8.47	116	71	37	28
Inhibited Admiralty	71[11]	28	Sn 1	x		x		x	1720	1650	0.308	8.53	112	64	42	25
Naval Brass	60	39.25	Sn 0.75	x	x	x	x	x	1650	1630	0.304	8.41	118	67	40	26
Leaded Naval Brass	60	37.5	Pb 1.75, Sn 0.75		x		x		1650	1630	0.305	8.44	118	67	40	26
Manganese Bronze (A)	58.5	39.2	Sn 1, Mn 0.3, Fe 1		x		x		1630	1590	0.302	8.36	118	61	43	24
Aluminum Brass	76[11]	22	Al 2	x					1780	1710	0.301	8.33	103	58	45	23
Phosphor Bronze, 5% (A)	95		Sn 5, P .03-.35	x		x	x	x	1920	1750	0.320	8.86	99	47	58	18
Phosphor Bronze, 8% (C)	92		Sn 8, P .03-.35			x	x	x	1880	1620	0.318	8.80	101	36	80	13
Phosphor Bronze, 10% (D)	90		Sn 10, P .03-.25			x	x	x	1830	1550	0.317	8.78	102	29	94	11
Phosphor Bronze, 1.25% (E)	98.75		Sn 1.25, P trace			x		x	1970	1900	0.321	8.89	99	120	22	48
Free-Cutting Phosphor Bronze	88	4	Pb 4, Sn 4, P .01-.50			x	x		1830	1700	0.321	8.89	96	50	55	19
Cupro-Nickel, 30%	70		Ni 30, Fe .4-.7	x		x	x		2260	2140	0.323	8.94	90	17	225	4
Cupro-Nickel, 10%	88.7		Ni 10, Fe 1.3	x		x			2100	2010	0.323	8.94	95	22	90	9
Nickel Silver, 65-18	65	17	Ni 18			x	x	x	2030	1960	0.316	8.73	90	19	170	6
Nickel Silver, 55-18	55	27	Ni 18			x	x	x	1930		0.314	8.70	93	17	190	5
Nickel Silver, 65-15	65	20	Ni 15			x			1970		0.314	8.70	90	21	150	7
Nickel Silver, 65-12	65	23	Ni 12			x		x	1900		0.314	8.69	90	23	130	8
Nickel Silver, 65-10	65	25	Ni 10			x		x	1870		0.314	8.69	91	26	115	9
High-Silicon Bronze (A)	94.8[10]		Si 3	x		x	x	x	1880	1780	0.308	8.53	100	21	150	7
Low-Silicon Bronze (B)	96.0[10]		Si 1.5	x			x	x	1940	1890	0.316	8.75	99	33	86	12

ED NOTE: Chart compiled from Copper and Brass Research Assoc. data.

[1] Not al
[2] Lb pe
[3] X 10
[4] Btu p

nd Copper Alloys

Electrical Conductivity[4]	Thermal Conductivity[7]	Modulus of Elasticity[8]	AVERAGE MECHANICAL PROPERTIES: Tensile Strength, 1000 psi		Yield Strength, 1000 psi		Shear Strength, 1000 psi		Elongation in 2 in., pct		CORROSION RESISTANCE[9]: Atmosphere Water											FABRICA			
			Hard	Soft	Hard	Soft	Hard	Soft	Hard	Soft	Industrial	Marine	Rural	Potable	Sea	Alcohol	Fuel Oil	Gasoline	Natural Gas	Sewage	Steam	Hot Working Range, °F	Annealing Range, °F	Machinability Rating (Free Cutting Brass = 100)	Cold Workability Rating[9]
101	0.092	17	50	32	45	10	28	22	6	45	E	E	E	E	G	E	E	E	G	E	E	1400–1600	700–1200	20	E
85	0.092	17	50	32	45	10	28	22	6	45	E	E	E	E	G	E	E	E	G	E	E	1400–1600	700–1200	20	E
101	0.092	17	50	32	45	10	28	22	6	45	E	E	E	E	G	E	E	E	G	E	E	1400–1600	700–1200	20	E
56	0.09	17	56	34	50	10	37	26	5	45	E	E	E	E	G	E	E	E	G	E	E	1400–1600	800–1450	20	E
44	0.09	17	61	37	54	10	38	28	5	45	E	E	E	E	G	E	E	E	E	E	E	1400–1600	800–1450	20	E
37	0.09	17	70	40	57	12	42	31	5	47	E	E	E	E	G	E	E	E	E	E	E	1450–1650	800–1350	30	E
40	0.09	17	66	39	56	11	40	29	5	46	G	G	E	F	F	E	G	E	E	F	F	1400–1650	800–1400	30	E
32	0.09	16	74	44	59	14	43	32	7	50	G	G	E	F	F	E	G	E	E	F	F	1500–1650	800–1300	30	E
28	0.09	16	76	47	63	15	44	33	8	62	G	G	E	F	F	E	G	E	E	F	F	1350–1550	800–1400	30	E
27	0.09	15	74	47	60	15	43	33	8	62	G	G	E	F	F	E	G	E	E	F	F		800–1300	30	E
28	0.09	15	70[12]	54	50[12]	21	44[12]	40	10[12]	45	G	G	E	F	F	E	G	E	E	F	F	1150–1450	800–1100	40	F
42	0.09	17	55[12]	37	50[12]	12	31[12]	24	12[12]	45	E	E	E	E	G	E	E	E	E	E	E		800–1200	80	G
26	0.09	15	75	47	60	15			7	60	G	G	E	F	F	E	G	E	E	F	F		800–1200	60	E
26	0.09	15	74	47	60	15	43	33	8	62	G	G	E	F	F	E	G	E	E	F	F		800–1300	60	G
26	0.09	15	74	47	60	15	43	33	7	60	G	G	E	F	F	E	G	E	E	F	F		800–1200	70	G
26	0.09	15	75	52	60	20			7	50	G	G	E	F	F	E	G	E	E	F	F		800–1200	80	F
26	0.09	15	74	49	60	17	43	34	7	52	G	G	E	F	F	E	G	E	E	F	F		800–1100	90	F
26	0.09	14	74	49	60	17			7	50	G	G	E	F	F	E	G	E	E	F	F	1300–1450	800–1100	100	NR
26	0.09	14	58[12]	49	45[12]	18	34[12]	53	25[12]	30	G	G	E	F	F	E	G	E	E	F	F	1300–1450	800–1100	100	NR
28	0.09	15		54[13]		20[13]		40[13]		45[13]	G	G	E	F	F	E	G	E	E	F	F	1150–1450	800–1100	60	F
27	0.09	15	80	54[14]	60	20[14]			6	40[14]	G	G	E	F	F	E	G	E	E	F	F	1150–1450	800–1100	70	F
27	0.09	15		52[15]		20[15]				45[15]	G	G	E	F	F	E	G	E	E	F	F	1200–1500	800–1100	80	NR
28	0.09	14		60[15]		20[15]		35[15]		30[15]	G	G	E	F	F	E	G	E	E	F	F	1150–1350	800–1100	90	NR
25	0.09	16		48[13]		18[13]				65[13]	E	E	E	E	E	E	E	E	E	E	E	1200–1450	800–1100	30	E
26	0.09	15	88	58	66	26	45[12]	40	18	46	G	G	E	F	G	E	G	E	E	G	E	1200–1500	800–1100	30	F
26	0.09	15	75[12]	57	53[12]	25	40[12]	36	15[12]	40	G	G	E	F	G	E	G	E	E	G	E	1200–1400	800–1100	70	NR
24	0.09	15	84[12]	65	60[12]	30	48[12]	42	19[12]	33	G	G	E	F	G	E	G	E	E	G	E	1150–1450	800–1100	30	NR
23	0.09	16		60		27				55	E	E	E	E	E	E	E	E	E	E	E	1400–1600	800–1100	30	E
18	0.09	16	81	47	75	19			10	64	E	E	E	E	G	E	E	E	E	E	E		900–1250	20	E
13	0.09	16	93	55	72	21[17]			10	70	E	E	E	E	E	E	E	E	E	E	E		900–1250	20	G
11	0.09	16	100	66		28			13	68	E	E	E	E	E	E	E	E	E	E	E		900–1250	20	G
48	0.09	17	65	40	50	14			8	48	E	E	E	E	G	E	E	E	G	E	E	1450–1600	900–1200	20	E
19	0.09	15	58[12]	44	40[12]	19			24[12]	50	E	E	E	E	G	E	E	E	E	E	E		900–1250	80	G
4.6	0.09	22	75[12]	55[13]	70[12]	20[13]			15[12]	45[13]	E	E	E	E	E	E	E	E	E	E	E	1700–1900	1200–1500	20	G
9.1	0.09	18	60[16]	44	57[16]	16			10[16]	42	E	E	E	E	E	E	E	E	E	E	E	1550–1750	1100–1500	20	G
6.0	0.09	18	85	58	74	25			3	40	E	E	E	E	E	E	E	E	E	E	E		1100–1500	20	E
5.5	0.09	18	100	60	85	27			3	40	E	E	E	E	E	E	E	E	E	E	E		1100–1500	30	G
7.0	0.09	18	85	55	75	19	52	41	3	42	E	E	E	E	E	E	E	E	E	E	E		1100–1500	20	E
8.0	0.09	18	85	54	75	19	52	41	4	45	E	E	E	E	E	E	E	E	E	E	E		1100–1500	20	E
9.0	0.09	17.5	86	51	75	19	55	41	4	46	E	E	E	E	E	E	E	E	E	E	E		1100–1400	20	E
7.0	0.09	15	94	58	58	22	57	43	8	60	E	E	E	E	G	E	E	E	E	E	G	1300–1600	900–1300	30	E
12	0.09	17	70	40	55	15	45		15	50	E	E	E	E	G	E	E	E	E	E	G	1300–1600	900–1250	30	E

[1] Not always available in all tempers.
[2] Lb per cu in. @ 68°F.
[3] X 10^{-7} per °F from 68° to 572°F.
[4] Btu per sq ft per ft per hour per °F at 68 F.
[5] Ohms per mil-ft @ 68°F (Annealed).
[6] Pct IACS @ 68°F (Annealed).
[7] Btu per lb per °F @ 68°F.
[8] X 10^{-7} psi.
[9] E—Excellent, G—Good, F—Fair, NR—Not Recommended.
[10] Minimum.
[11] Also 0.02 to 0.10 pct inhibitor, such as As, Sb or P.
[12] Half hard.

Features of the new
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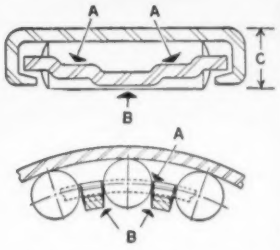

- rollers end-guided at pitch line (A)
- shaft-riding retainer (B) designed to permit lubricant circulation
- high capacity in small cross section (C)
- long pregreased life
- efficient at high speeds
- mounted by press fit
- simple housing design
- low unit cost

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Highly efficient roller guidance and lubrication are outstanding features. The shaft-riding retainer contacts the roller ends at the pitch line where guidance can be obtained with the least effort. The design provides ample storage for lubricant and promotes its circulation.

These features make the new bearing particularly suited to applications requiring compactness with precision, high-speed endurance or long pregreased life.

For information on sizes now available and for application assistance, call on our Engineering Department or write for the new bulletin, "Torrington Drawn Cup Roller Bearings." THE TORRINGTON COMPANY, Torrington, Conn. – and South Bend, Ind.

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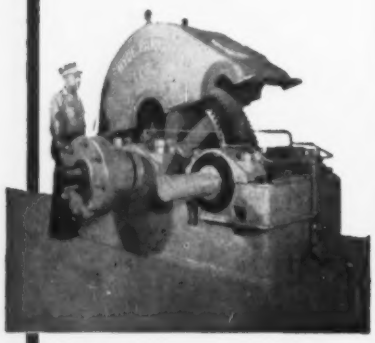

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X-ray Unit Speeds Foundry Analysis

Looking for a way to get foundry heat samples analyzed in a hurry? Then maybe you'd profit from looking over the x-ray analysis process.

Using this, one foundry does many jobs in one-fifth the time previously necessary with wet chemical methods.

▪ Wet chemical methods have given way to X-ray analysis at the Bell, Calif., plant of Thompson Products, Inc. This is because it's possible to do many jobs in 1/5 the time with accuracies of ½ of 1 pct on routine work and 2/10 of 1 pct under favorable conditions. On certain quantitative tasks where 100 analyses formerly took eight hours, the X-ray Spectrograph now gives the answers in three hours.

Using an abrasive wheel, a tool grinder prepares a specimen.

The Thompson foundry is capable of pouring 16 heats a day. Typical alloys include heat resistant metals with a high percentage of chrome and nickel, stellite with a high percentage of cobalt, chrome and tungsten, and some low alloy steels such as SAE 4140 and 4340.

Speeds Foundry Job—Obviously, an analysis is necessary on each heat and it was difficult to hold a heat while a six- to eight-hour chemical analysis was made. Now with X-ray analysis, it takes ½ hour to get the same information. On many alloys, the analysis time by the X-ray method is about one to three minutes per element.

According to the company, the X-ray analysis instruments also help to control the quality of purchased alloys. Since much more of this work can be done accurately in a given period of time, there is less chance for a below-standard shipment to be accepted.

Steel Floors Smooth

Bumpiness has been a long-tolerated vice of steel armor floor plates. Materials handlers rolling over them have found many a bump, much to the discomfort of items en transit. But now, even this disadvantage is non-existent.

The old-style roundness or large radius of the plate edge is now being eliminated. One maker, Hercules Flooring Co., New York, is substi-

Want More Data?

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tuting a sharp, square cut corner instead. Concrete runs through side anchor slots to establish a permanent bond with adjoining plates. This forms a smooth, level, integrated traffic surface.

Safety islands in each square foot of plate surface have been increased from 25 to 43. This provides more non-skid points for sure footing.

Plant Safety Vehicles Meet Emergencies

Two compact safety service vehicles are equipped with tools to meet emergency fire or rescue situations and provide Civil Defense preparations. They're in operation at the West Allis Works of the Allis-Chalmers Mfg. Co., Milwaukee.

The rescue unit was designed by the Allis-Chalmers emergency rescue committee. This vehicle, built around the Allis-Chalmers "Choreboy" platform truck chassis from the company's Harvey Works, was constructed in the West Allis Works machine shop maintenance department.

The fire fighting unit, also resting on the "Choreboy" chassis, was made by SECO Engineering and Manufacturing, Inc., Detroit, to meet company specifications.

Small Units—To attain maximum mobility, even in the confines of shop aisles, the units are small. The rescue unit is only 42 in. wide, 8 ft long and 5 ft, 10 in. high. The fire fighting unit is 42 in. by 10 ft by 5 ft, 11 in.

The emergency rescue unit includes the following major safety service equipment:

Two porto-power jacks capable of lifting 40 tons; a 2,500 w, 110 v motor generator to provide emergency lighting and power rescue equipment should electrical facilities fail; a portable stretcher built to also provide artificial respiration by "eve" resuscitation; an explosimeter to register any explosive elements in the atmosphere; an asbestos suit, asbestos blankets, and a gas mask.

There is also a six-ton and a one-half ton chain hoist, cable slings,

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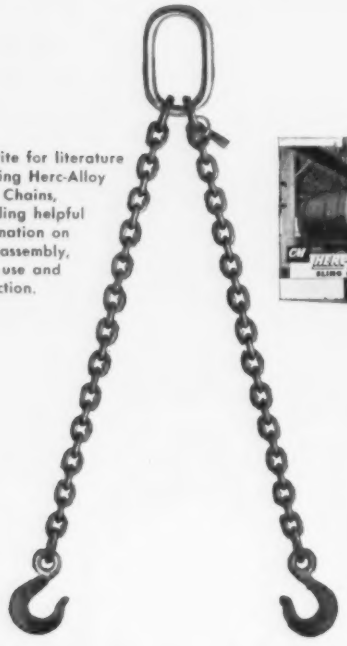
● Herc-Alloy, the original alloy steel chain, is available in running lengths as well as in all types and sizes of slings made to customer specifications.

● Write for literature covering Herc-Alloy Sling Chains, including helpful information on their assembly, care, use and inspection.



● CM also produces a complete line of chain attachments and welded chain of all types including stainless steel and bronze.

Hammerlok® COUPLING LINKS

● Assemble or rebuild your own Herc-Alloy sling chains with all components furnished by your local distributor. Hammerlok is simple, safe, reusable. New Herc-Alloy assemblies can now be ordered with welded or Hammerlok Coupling Links as desired.

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Herc-Alloy®

wire and manila rope, cutting torch, shackles, clamps, blocking, axes, saws, ladders, bolt cutters, a "hot stick" and gloves for removal of "hot" wires and an assortment of smaller general tools.

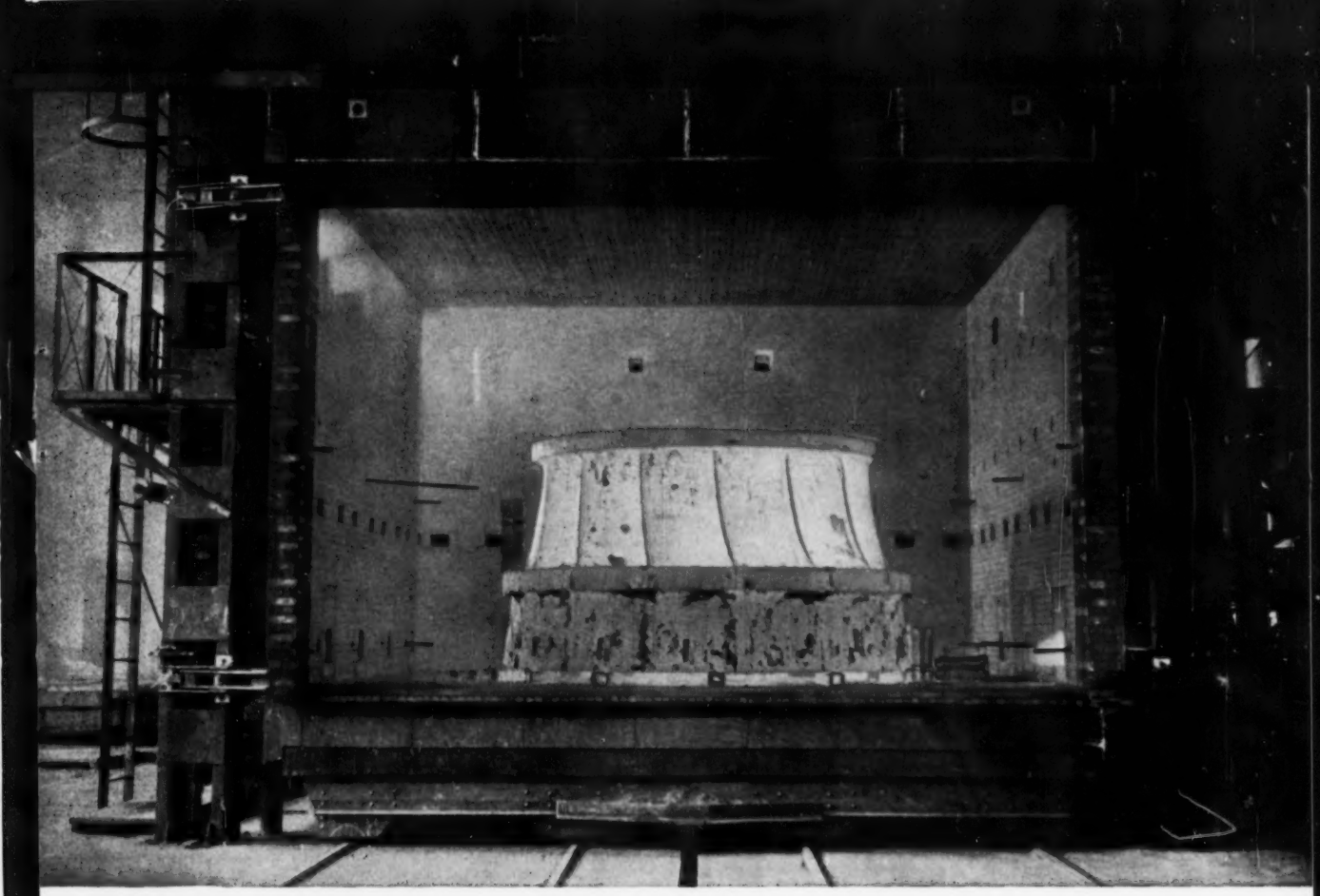
Fire Fighter—The fire fighting unit's equipment includes: a 170-gal water tank with an auxiliary power-booster pump which will provide a nine-minute supply of water for one hose, ample time to allow for the hook-up of the equipment to main hydrants after which two hoses can be supplied.

A 350-lb Ansul dry chemical unit is capable of extinguishing a 500-sq ft deep-seated liquid fire. The three 30-lb dry chemical units

When needed, this unit quickly moves into action.

are each capable of extinguishing a 40-sq ft deep-seated liquid fire. There is also a 2½-gal water pump; a 5-lb carbon dioxide extinguisher, and a 25-gal liquid-foam injector unit that will provide 2,000 gal of foam to smother liquid fires.

In addition the fire unit carries an 18-ft ladder, 100-ft of 1-in. hard rubber hose, 250 ft of 1½-in. rubber-lined cotton fire hose, axes, wrecking bars, a piercing bar for attachment to hose with a nozzle which can be rammed through sheet metal to extinguish stack or metal container fires, and other nozzles to



For best performance and maximum economy

7 different specialized refractories used in annealing furnace lining

Engineering a furnace lining with *specialized* refractories can save dollars on construction, fuel and maintenance as well as extend productive working time. To achieve these results, seven different B&W refractories were used in the lining of this 25′ x 23′ x 14′ annealing furnace.

Fuel savings and close temperature control were made possible by using three types of *lightweight* B&W Insulating Firebrick. Walls are composed of *B&W K-23 IFB* backed up with *B&W K-16*. Because of the proximity of the burners, the roof was constructed of *B&W K-26 IFB*, a higher temperature brick to guard against the effect of possible localized overheating.

The weight saving construction means about 100 lb less refractory material to heat up per sq ft than with ordinary firebrick, or about 28 tons less in the roof of the furnace. Furthermore, supporting steel is less massive, far less costly. Commercial size steel can be used for roof suspension instead of special steels.

To eliminate the need for expensive special shapes, the burner tunnels are formed of *B&W's 3000 F refractory castable, Kaocast*. Lintels over the burners and jambs are constructed of rugged *B&W Junior Firebrick*.

To take advantage of fast, easily installed castable construction, *B&W Kaocrete-D* was used in the nose arch (separately pictured). This sturdy castable with a 2500 F use limit was selected to provide strong resistance to abrasion caused by door operation. In addition, the need for costly fired shapes and their supporting castings was eliminated, as was a great deal of expensive engineering detailing.

Nose arch, cast of B&W Kaocrete D, immediately after removing forms.

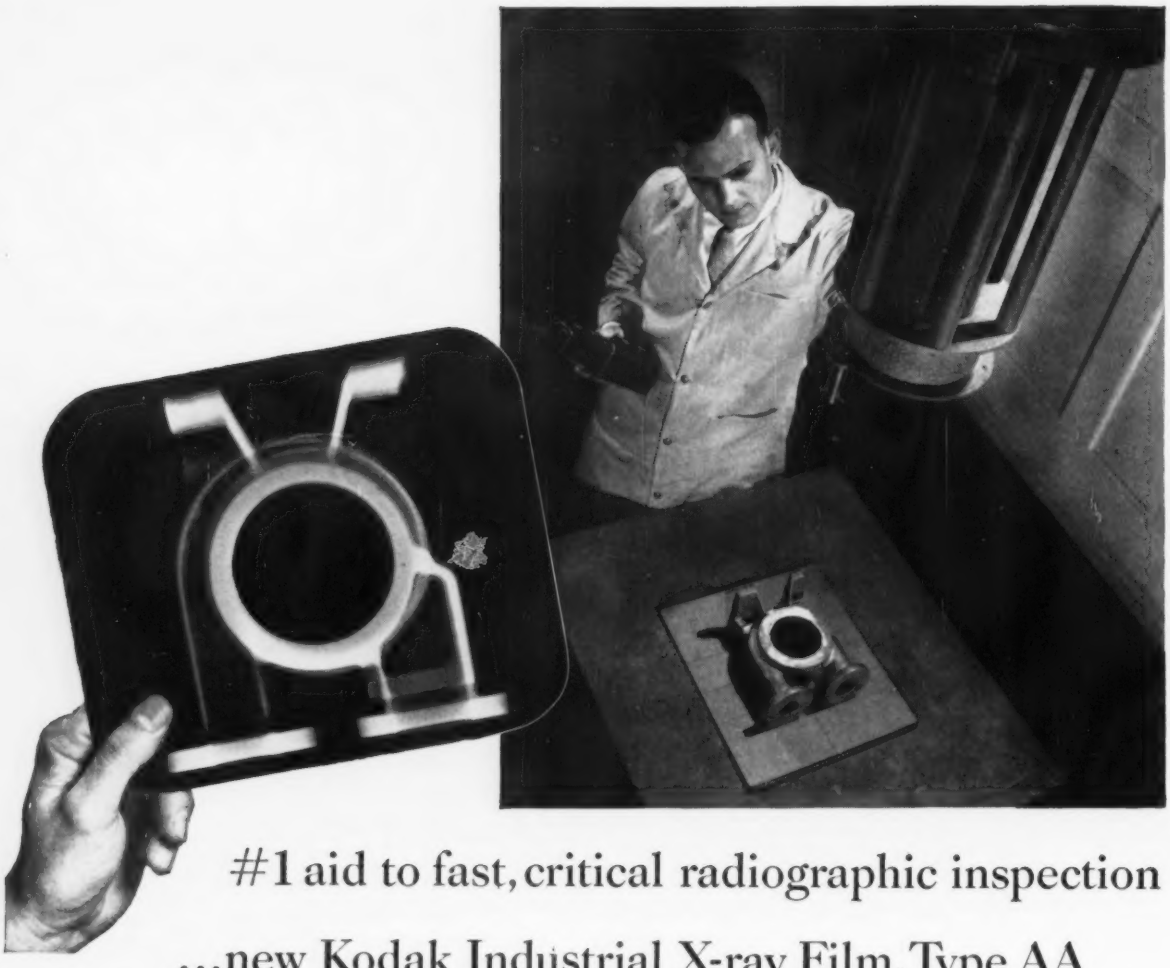
The car top is insulated with *B&W Kaolite-20*, a 2000 F insulating refractory concrete.

For further information, write for B&W bulletin R-2-H on insulating firebrick and B&W bulletin R-35 on castables.

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

R-574



#1 aid to fast, critical radiographic inspection ...new Kodak Industrial X-ray Film, Type AA

TODAY'S radiographic inspections call for increased sensitivity, greater speed. And these are the characteristics of Kodak's newest industrial x-ray film, Kodak Industrial X-ray Film, Type AA.

This film retains all the excellent qualities that made Kodak Type A the most widely used x-ray film in industry. Then, in addition, it provides greatly increased speed.

This permits exposure time to be cut as much as 50%. It allows adjustment of the radiographic factors to obtain greater contrast and easier readability.

Kodak X-ray Film, Type AA can multiply your minutes—can extend the usefulness of your present radiographic equipment.

Find out all the ways it can improve your production. Get in touch with your x-ray dealer or Kodak Technical Representative.

EASTMAN KODAK COMPANY
X-ray Division Rochester 4, N. Y.

Read what the new Kodak Industrial X-ray Film, Type AA, does for you:

- Reduces exposure time—speeds up routine examinations.
- Provides increased radiographic sensitivity through higher densities with established exposure and processing technics.
- Gives greater subject contrast, more detail and easier readability when established exposure times are used with reduced kilovoltage.
- Shortens processing cycle with existing exposure technics.
- Reduces the possibility of pressure desensitization under the usual shop conditions of use.

Kodak

Kodak Industrial X-ray Film, Type AA and Type M is now available in 100-sheet boxes wrapped without interleaving paper. Designated as AA-100; M-100.

reach overhead fires and to provide either straight stream or fog spray application to the fire.

First Line Defense—The fire fighting unit has been designed to provide immediate defense in event of fire. The unit can reach any location within the main erection and machine shop areas. It's equipped to fight any type of fire until the West Allis fire department can take over.

The units provide vital personnel training and equipment to the in-plant Civil Defense program and thus they serve a two-fold purpose.

The two units ride on solid laminated rubber tires that eliminate the danger of flat tires. They can reach any location in the main shop area within a maximum of five minutes after they have been summoned over an emergency telephone call system.

Ductile Iron Reduces Fire, Corrosion

In a new application of ductile iron refineries may have a solution to their safety problems of fire and corrosion in piping systems. It has the high corrosion resistance of cast iron and the good mechanical properties of steel.

Thermal shock tests on ductile iron valves show that they have a resistance equal to that of the more expensive steel valves.

High Heat Test—Refinery engineers visiting the Boston Works of the Walworth Co., a manufacturer of valves and fittings, watched a demonstration in which a six-inch ductile iron gate valve was heated to a red-hot temperature of 1350°F, and then suddenly water quenched. While a cast-iron valve would shatter under such a drastic and rapid change in temperature and thus open the lines to fire, the ductile valve retained its shape and dimensions.

The test approximated an actual refinery fire to include the types of stress to which valves are subjected in those conditions. Heavy weights on each end of the I beam support-

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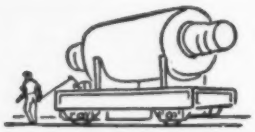
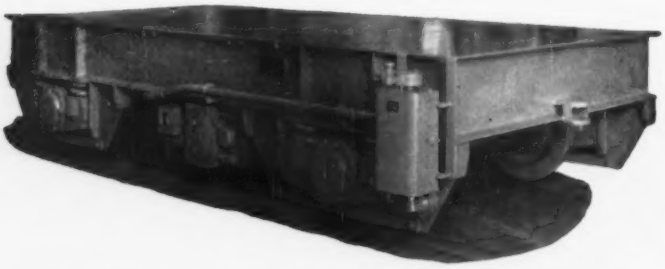
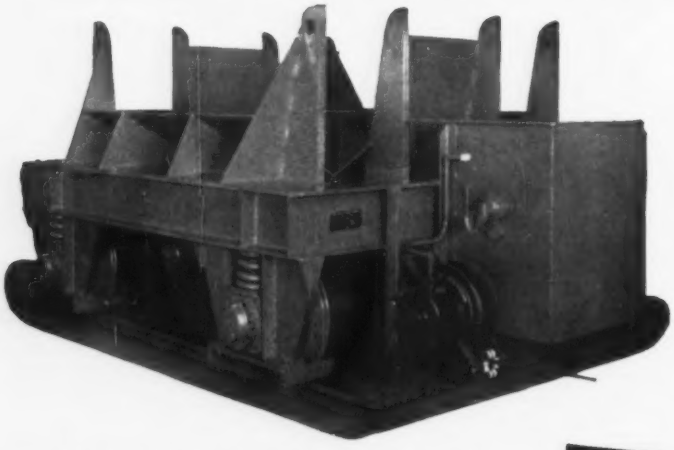


Atlas Safety-Type Transfer Cars are outstanding for moving heavy materials over short distances. Designed for storage battery, diesel or gas-electric, or cable reel service. Only one simplified control lever for safety. The car moves only when the operator holds the lever.



50-TON STORAGE BATTERY FLAT CAR



64-TON ELECTRIC FLAT CAR

Request "Walk-Along" Bulletin 1283

THE ATLAS CAR & MFG. CO.
ENGINEERS MANUFACTURERS
1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

ing the valve simulated the external stress which expanding piping in a refinery fire would exert on a valve.

Stress due to differences in expansion of the valve body from uneven heating was achieved by concentrating an oil fire and a gas flame on one side of the valve.

Withstands Corrosion — Earlier tests and present applications of ductile iron valves prove the metal's excellent corrosion resistance. Ductile iron valves are pres-

Testers water quench a valve at 1350°F without it shattering.

ently serving in lines on oil tankers where they handle alternately crude oil as cargo and sea water as ballast.

Other ductile iron equipment gives promise of a service life longer than the tankers in which it is used. Atmospheric corrosion tests of carbon steel and ductile iron show the latter to have a five times greater resistance.

Much tougher than cast iron, ductile iron also compares favorably with carbon steel in strength. One grade of ductile iron stood up as well as ordinary grades of mild carbon steel for shock resistance in explosion tests conducted by the U. S. Navy.

Ladle Is Light

A lightweight steel teeming ladle, designed and built by Pennsylvania Engineering Corp., New Castle, Pa., carries an additional 15 tons

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TECHNICAL BRIEFS

of molten metal yet weighs 16,000 lb less than conventional ladles.

One such ladle, built for a major steel producer, is performing successfully carrying 150 tons of metal with a shell weight 16,000 lb lighter than the conventional 135-ton ladle. This is accomplished by engineering design improvements only—without reduction of strength or the use of alloys.

Outstanding features of the new ladle are: heavy box-section bands

Though light in weight, this ladle has a high capacity.

and shell stiffeners for a high strength-to-weight ratio, cast segmented combination brick ring and top stiffener for convenient maintenance, a heavy dished bottom riveted to shell for easy service, and a payload-to-shell weight ratio of almost 8 to 1 instead of the usual 5 or 6 to 1.

Ti Blind Bolts

Hi-Shear Rivet Tool Co., Torrence, Calif., is currently manufacturing blind bolt fasteners entirely in titanium for Northrop Aircraft, Inc.

Under development for over five years, stainless steel and 5056S aluminum alloy blind bolts have gained wide acceptance throughout the aircraft industry for structural and repair applications. This fastener was designed primarily for normal blind applications where the work is accessible from only one side.

12 Ton Plymouth Locomotive operates 24 hours daily over 10 mile track system at this modern steel mill

PLYMOUTH lowers production costs by keeping steel in process on the move!

You get the reliability that returns greater profits when you put a Plymouth Locomotive to work—and the more continuous usage you give it, the more you benefit. There are many good reasons for that.

Plymouth Locomotives are built to handle big jobs with speed and efficiency around the clock—in all kinds of weather. Instant availability, low maintenance requirements, and faster switching, spotting and hauling performance reduces costs all around. Smooth starts and ease of control make Plymouth popular with the operators, reduce fatigue, and keep efficiency high.

We make both gasoline and Diesel Locomotives from 3 to 80 tons—either mechanical or Torqomotive (hydraulic torque-converter) drive—there's a Plymouth Locomotive that will fit your requirements perfectly.

"Saving time and money with our Torqomotive," says this user.

Within a few months after the Plymouth Diesel Torqomotive shown above was delivered, this Eastern steel manufacturer knew they had an outstanding locomotive. "Too early for actual cost figures," was the report, "but haulage by Plymouth is superior to previous methods. Our operator likes it better, too."

Send us a brief outline of your operation and we'll send you a recommendation promptly. Address: Plymouth Locomotive Works, The Fate-Root-Heath Company, Dept. A-2 Plymouth, Ohio.

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RAIL POWER

PLYMOUTH LOCOMOTIVES— in PROGRESSIVE INDUSTRY throughout the WORLD

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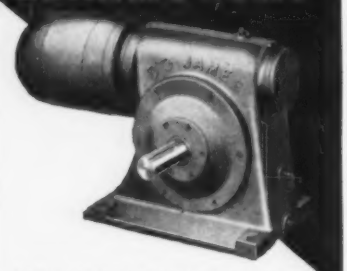
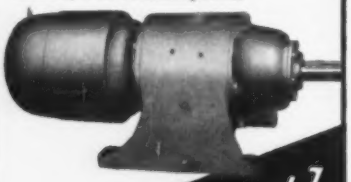
D.O.James
GEARMOTORS



RIGHT ANGLE GEARMOTOR—Horizontal or Vertical Drive, 8 sizes, ratio 6:1 to 100:1, ⅓ to 30 horsepower.

IN-LINE GEARMOTOR—Horizontal or Vertical Drive, 37 sizes, ratio 9.2:1 to 1200:1, 1 to 75 horsepower.



OUR 70th YEAR

THE D.O.James Gearmotors are of the same construction and high quality as the individual Gear Speed Reducers which we have been producing for so many years.

They cover a very wide range of ratios, horsepowers, and are an ideal, compact, efficient unit for many power and space-saving installations. They are designed and built by an organization that has been engaged in the manufacture of Gears for 70 years and that has successfully pioneered the Gear Speed Reducer to its present-day high standards.

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Catalogs, price lists and selection tables covering gear speed reducers and gearmotor speed reducers are available to power transmission engineers. Please request on company Letterhead—we'll mail your copy at once.

MATERIALS ROUNDUP

Roof Compound Paints on With Brush

Many old plants and warehouses have worn roofs. When leaks start, maintenance men must go into action with tar, shingles, nails, hammers or whatever costly roofing materials are necessary.

Wouldn't it be nice if somebody developed a roof that goes on like painting a wall? Well, somebody has. Not only does it stop leaks, it reflects light, looks attractive.

▪ If you have a plant or warehouse with a worn roof, you can re-roof it without using new shingles, hammers or nails. Instead, you use a paint brush. If this seems a little unreasonable, it's simply because it hasn't been too widely done until recently.

Teaming up with the paint brush is a new product of the Aluminum Company of America, Pittsburgh. These two items plus someone to apply the material result in new roofs from old. Already being produced and distributed by several manufacturers, the material is a colored aluminum asphalt coating. One coat produces a metallic protective finish that waterproofs, insulates, decorates and preserves practically any type roof.

Several Colors—The roofing compound comes in several colors. These include: copper, gold, blue, green, brown and aluminum.

Easily applied with a brush, squeegee or spray gun, the colored aluminum coating remains elastic, reflective and resistant to many chemical attacks. Drying from the sun and erosion from water are practically non-existent. Roofs treated with the new material reflect up to 71 pct of the sun's rays. This means less cash out for insulation, electrical cooling devices, etc.

Other Uses, Too—The new coating is also suitable for waterproofing, decorating of vertical walls. It goes over cement, concrete, stucco, cinder block.

Sandwich Adhesive

A new high performance adhesive eliminates core priming in sandwich component fabrication. It also improves peel strength. So reports Narmco Resins & Coatings Co., Costa Mesa, Calif. The material consists of a nylon carrier impregnated with a modified phenolic resin and overcoated on one surface with a highly mobile filleting resin.

Die-surface Coat

A blue epoxy resin compound is for use in hand lamination systems where surface hardness and abrasion resistance are essential. The material can be applied by brush on a vertical surface without sagging. Used with a laminating resin and glass cloth, it produces hard-surfaced, lightweight dies. It also may

Want More Data?

You may secure additional information on any item briefed in this section by using the reply card on page 113. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

be used alone as a surface coat for tanks and barrels, and as a bonding agent.

Smooth-On Mfg. Co., Jersey City, N. J., makes the compound.

Repairs Floors

Have a floor that needs refinishing? Maybe a new floor repair material can do the job for you. The floor resurfacing, repair material comes in drums, ready for use. It withstands 50,000-lb immediately after applications. So reports The Monroe Co., Inc., Cleveland, Ohio, its developer.

Cutting Oil

Combining the cooling ability of water with lubricity and protection of oil is a new cutting oil. The emulsified oil is said to substantially increase the efficiency of many heavy-duty machining and grinding operations. This means longer tool lives, heavier cuts, higher speeds and feeds. These benefits apply to all metals, particularly those with low machinability ratings. So reports Gulf Oil Corp., Pittsburgh, the oil's developer.

Fights Rust

Just push a button and a new rust fighter goes into action. The penetrating oil (and solvent) spray comes in a pressure-spray can small enough to fit in the palm of the hand. Available in 6 and 16-oz cans, the penetrant is recommended for freeing rusted items and frozen parts. Krylon, Inc., Norristown, Pa., supplies it.

Pure Silicon

Extremely pure silicon now available under license to manufacturers has less than one part of impurities in 6-billion. Using a new process developed by Siemens & Halske and the Siemens - Schuckert companies in Germany, Westinghouse Electric Corp., Pittsburgh, is now producing the material in this country.

Now even the "atomic age" metals

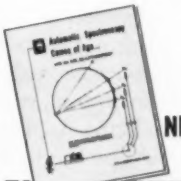
... they too are a matter of simple routine analysis on the QUANTOMETER*—here's why...

It takes good dispersion to give reliable analytical results on titanium, zirconium, uranium, jet alloys and other alloys producing complex spectra. ARL's improved Model 9500 direct-reading Production Control Quantometer provides greater dispersion, plus greater spectral range than ever before available. The finest quality gratings of 24,400 lines per inch yield a coverage of 1966A to 8750A. Excellent dispersion is available–2.6A per mm in the second order. Broad coverage permits the wisest choice and flexibility of spectral lines to handle the complex spectra of today's alloys. Up to 68 spectral lines may be measured simultaneously.

Choice of the most effective analytical lines permits accurate analysis of the "problem" metals in a routine manner with the Quantometer. The improved line-to-background ratio gives added precision and accuracy—increases sensitivity.

The pen and ink recording on a strip recorder pioneered by ARL reduces human error in transposing results—gives a permanent record in carbon copies if desired.

*Trade Mark



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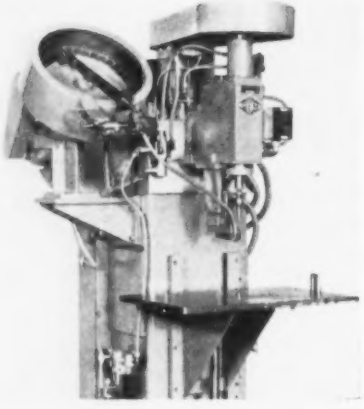
New Production Ideas

Equipment, Methods and Services

Copying Machine Delivers Prints at High Speeds

Want engineering drawings copied at high, rapid rates? Then, this continuous printer may be just what you're looking for. It copies from one or a series of original documents—resulting in dry, positive prints up to 11-in. wide. This is done at a 20-fpm rate. That's equal to a full 11-in. print every three seconds. The reproduction is by xerography, a fast, dry, electrostatic copying method producing direct, positive prints of high quality. The process is continuous and automatic; it makes prints in one cycle. Unlike the firm's earlier models, the unit by-passes the microfilm stage by substituting an opaque-head lens arrangement that reduces documents as much as 24 inches to the 11-in. width limitations of the printer. Small items may be reduced up to 200 pct. Another model turns out prints from roll microfilm only; still another combines the microfilm and the new opaque-head systems. (Haloid Co.)

For more data circle No. 40 on postcard, p. 113



Stud Driver Produces to 630-in.-lb of Torque

For heavy-duty applications, this stud driving machine delivers up to 630 in.-lb of driving torque. The unit drives standard studs of up to ⅝-in. diam, self-tapping studs and tap-locking inserts. The drivers are of the screw-on or self-opening type. Available with either single or multiple spindles, it can employ to a 3-hp spindle drive; its spindle feed is an air-hydraulic one. Capacity of the machine is up to 1000 cycles per hour. The studs automatically feed from a hopper. It is relatively easy to retool the stud driver for other applications. This unit has proven successful in setting inserts and studs in cylinder heads and crankcases on diecast aluminum engines and with other diecastings. Available direct from the manufacturer, the stud driver comes ready for use. (Gray Equipment Co.)

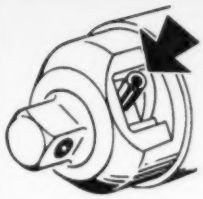
For more data circle No. 41 on postcard, p. 113

Electronic Gage Measures with Precision

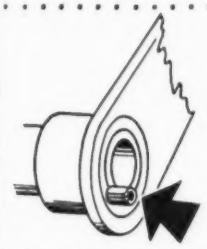
If precision measurements are absolutely necessary to your work, maybe this new electronic gage could come in handy. Basic unit of the new measurement system is a small size, hermetically sealed gage head. This makes use of a unique method of electro-magnetic operation. Electrical and mechanical sensitivity of the probe unit is capable of providing magnifications and accuracies which exceed normal needs of present day precision gaging requirements. The electrical-probe head, measuring approximately 1½ x 2½ x ½ in., can be used with various types of contacts and contact mountings. It operates with any one of several types of amplifiers. Its gage heads are interchangeable; they'll work jointly or in rapid succession by switching. Here, the gage head is used with a test indicator instrument. This instrument is battery powered, transistor amplified. (Federal Products Corp.)

For more data circle No. 42 on postcard, p. 113

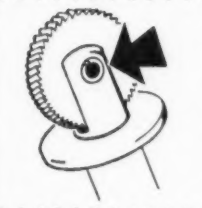
Rollpin® replaces 12 different fasteners



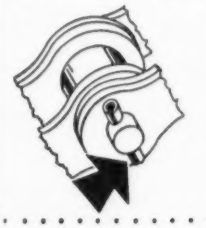
REPLACING A GROOVED PIN . . . in this application, Rollpin serves as a stop pin in a ratchet wrench adaptor. With its light weight and high shear strength, Rollpin functions perfectly . . . cuts assembly costs.



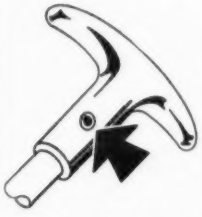
REPLACING A KEY . . . Rollpin demonstrates its ability to do away with precision tolerances, in this heating system damper arm. Faster, cheaper and more satisfactory than previous assemblies.



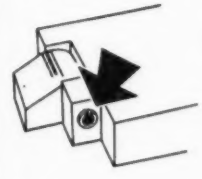
REPLACING A RIVET SHAFT . . . Rollpin serves as an axle for the sparkwheel of a cigarette lighter. No riveting or threading necessary . . . faster assembly. Note flush, clean fit.



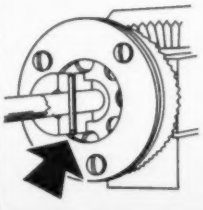
REPLACING A COTTER PIN . . . Rollpin assembly time is shorter, service life ten times longer. Vibration-proof flush fit. Easily removable.



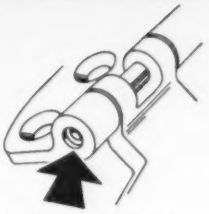
REPLACING A SET SCREW . . . to fasten automobile brake handle a short length Rollpin is self-retained in the hand grip but can easily be driven into over-drilled hole in shaft for simple handle removal.



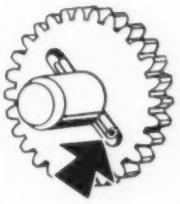
REPLACING A CLEVIS PIN . . . here Rollpin holds firmly in clevis, permits free action of moving member. Rollpin application shown is the plate of a home workshop tool.



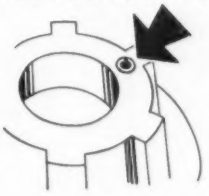
REPLACING TAPER PINS . . . in the assembly of precision differentials eliminated cost of taper pin reamers and the entire reaming operation. Rollpin costs less than a taper pin and installation is cheaper. They remove easily.



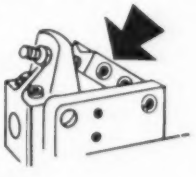
REPLACING A HEADED PIN . . . in this hinge pin application, Rollpin is simply and inexpensively driven in place, greatly reducing assembly costs. Constant spring tension holds Rollpin firmly in place . . . eliminates loosening of hinge due to wear.



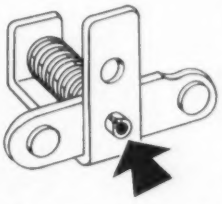
REPLACING A HUB ON A GEAR . . . Rollpin, self-retained in shaft, is simply snapped into molded slot to position sintered gear. This application, by an office equipment manufacturer, effects major savings in assembly. Rollpin's high shear strength is particularly valuable here.



REPLACING A DOWEL PIN . . . Rollpin is used here to prevent rotation of a thrust bearing. No reaming, no special locking. Easily removed. Lowest possible dowel pin cost.



REPLACING A BOLT AND NUT . . . Rollpins act as fasteners and pivots for the linkages in this electric welder. Rollpins may be used with a free fit in outer or inner members depending upon product design requirements.



REPLACING A RIVET . . . Rollpin serves as guide shaft for spring-loaded electrical interlock contacts. This electrical equipment manufacturer reports that rivet failure previously occurred at the clinched end under normal operating impact and vibration.

WHERE CAN YOU USE THIS SIMPLE FASTENER?

Rollpin is the slotted tubular steel pin with chamfered ends that is cutting production and maintenance costs in every class of industry.

Drives easily into standard holes, compressing as driven. Spring action locks it in place—regardless of impact loading, stress reversals or severe vibration. Rollpin is readily removable and can be re-used in the same hole. Made in carbon steel, stainless steel and beryllium copper. Write for samples and information, ELASTIC STOP NUT CORPORATION OF AMERICA, 2330 Vauxhall Road, Dept. R47-977, Union, New Jersey.

ROLLPIN TRADEMARK

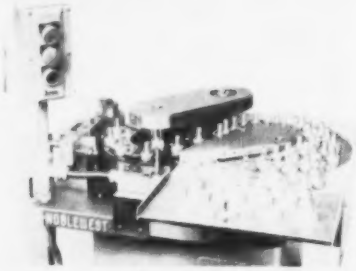
ELASTIC STOP NUT CORPORATION OF AMERICA

2330 VAUXHALL ROAD, UNION, NEW JERSEY

Gearmotor Trio Features Cast Iron Components

Corrosion resistant cast iron is employed throughout a new line of gearmotors. The trio of units making up the line have housings, carriers and endshields all of cast iron. Another feature of the three models is the degree of flexibility which is built into the mounting. The units are designed to cover a wide range of mounting requirements. This permits the economical usage of available space. It also allows locating the gearmotors where maintenance and service man can easily reach them. An oil level kit permits users to adapt the unit in the field to extreme mounting positions when needed. Still another key asset of the gearmotors is the ease with which ratio changes may be made. The high speed shaft is bored to take a removable pinion. This permits quick changes of pinion and gear sets in the field. (General Electric Co.)

For more data circle No. 43 on postcard, p. 113



Unit Rapidly Marks Cup-shaped Parts, Tubes

Designed for marking thin-wall, cup shaped parts or tubes is this machine. The high speed automatic unit roll-marks permanent indents of part numbers in each workpiece at a production rate in excess of 5000 pieces per hour. It features two counter rotating dials. A hand wheel at the side of the machine provides infinitely variable speed adjustment. Parts rotate on work mandrils as they travel across the marking die face. They eject when finished. (The Nobile & Westbrook Mfg. Co.)

For more data circle No. 44 on postcard, p. 113

LOOK INTO STUD WELDING!...

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Ray Scheel
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These fastening engineers are augmented by a headquarters sales staff and 35 field sales office, warehouse and service employees, plus a nationwide organization of 18 distributors – backed up by the world's greatest pool of stud welding know-how at the Nelson Research and Development Laboratory in Lorain, Ohio.

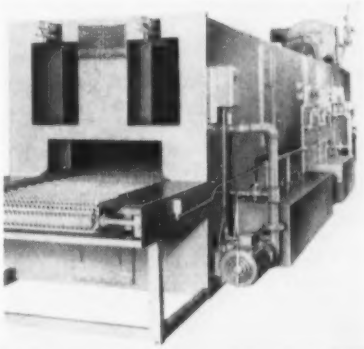
NELSON STUD WELDING...

Small Kit Lets Shopmen Move Loads with Ease

Packaged mobility for machinery, products and equipment up to 6000 lb is provided by a moving kit. Designed to handle loads of every shape and dimension, from three tons down, the kit is self-contained in a steel case occuping only 13½ in. of storeroom shelf space. It provides an inexpensive, in-plant answer to problems of moving bulky items. Similar in principle to heavier roller skids used with loads to 600,000 lb, the junior-size kit consists of four roller dollies. Each of these had a load capacity of 1500 lb; each measures 12 x 5 x 3 in. These dollies are positioned under the load as needed; they're equipped with swivel heads which hold the load steady while the dolly can be turned to a full 180°. The kit allows moving of equipment around corners and through narrow, difficult to maneuver, openings. (Stokvis-Edera & Co.)

For more data circle No. 45 on postcard, p. 113

One Washing Machine Does the Work of Three



This automatic three-in-one washing machine provides for all cleaning operations in one central area; it virtually eliminates rehandling of parts following cleaning. Because it performs the work of three separate washers in a single housing, the machine saves floor space; it thus reduces operating and maintenance costs, too. Two overhead conveyors and a flat wire mesh belt conveyor pass through the machine, which incorporates an automatically-timed wash-rinse-dry cycle. The flat wire mesh belt handles parts, including machined parts. These usually cannot effectively be cleaned and dried when suspended from the overhead conveyors. All three conveyors work simultaneously or individually. (Alvey-Ferguson Co.)

For more data circle No. 46 on postcard, p. 113

contact the man who can help you most...

your NELSON FASTENING ENGINEER

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George James
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Please send a NELWELD Design Manual. ☐

Please send a Construction Application Data Manual. ☐

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NEW EQUIPMENT

Machinist's File

Ferrous and nonferrous metals can be worked easily with a new machinist's file. The all-purpose tool has coarse, single cut teeth. These are interrupted by long, narrow chip breakers which create hundreds of individual chisel-type scallops. Rapid stock removal and a smooth finish are created simultaneously. The file comes in 8, 10, 12 and 14-in. lengths. (Nicholson File Co.)

For more data circle No. 47 on postcard, p. 113

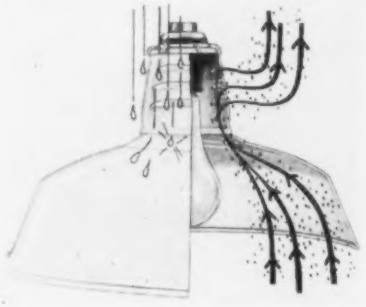
Low-temp Furnace

Slot-in-roof box type furnaces recently developed particularly adapt to applications employing low-temperature enamels used on aluminum, aluminized steel and stainless steel. Using manually operated suspension components, the furnaces come with or without forced convection in both gas-fired radiant tube or electric models. The units feature uniform temperature control; low heat loss is assured by lining the steel shells with insulated brick and block. (Ferro Corp.)

For more data circle No. 48 on postcard, p. 113

Clean Lamps

Dirty lamps in the shop can cause trouble. Dirt on reflectors cuts down light. That creates a double safety-hazard: less light means more accidents; more dust means a health hazard. In an attempt to do away with these, one company has introduced a new light fixture design. Its new units have neck vents; these vents produce "chimney action" up and through the reflector to slow down accumulation of dirt and grime. Light output thus remains high and fewer costly cleans are needed. This louvered design also protects the lamp—when used outdoors—from winds and moisture. (The Miller Co.)



For more data circle No. 49 on postcard, p. 113

Punch Clamp

Thanks to new mechanical punch clamps, it's possible to mount punch dies to press slides quickly with little effort. Simple in design and operation, the clamps mount to the press' slide flange; this makes them difficult to lose or misplace. Three screws mount a pivot base to the top of the slide flange. This mounting method removes all tensile loading from these screws. A swing T-bolt fits through an open slot in the side flange to a pocket on the die; this is threaded at the top and keyed to

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TRADE MARK REGISTERED

PREVENTS MOTOR "BURNOUTS"

When common oil escapes from bearings and soaks motor windings the result is generally a short circuit and a costly "burnout." NON-FLUID OIL is ideal for ring-oiling motors because it does not leak, creep or throw out of bearings—so does away with short circuits from that cause.

Ordinary greases are equally undesirable for use in ball or roller bearing type motors. They will not lubricate until softened by frictional heat and leave gummy residues that develop fatty acids and waste power.

Motors lubricated with NON-FLUID OIL run steadily with cool bearings and clean frames. You save money, too, because NON-FLUID OIL lasts longer and needs less frequent application.

Send for a free testing sample of NON-FLUID OIL and informative Bulletin No. 504. State size and type of motor on which test will be made.

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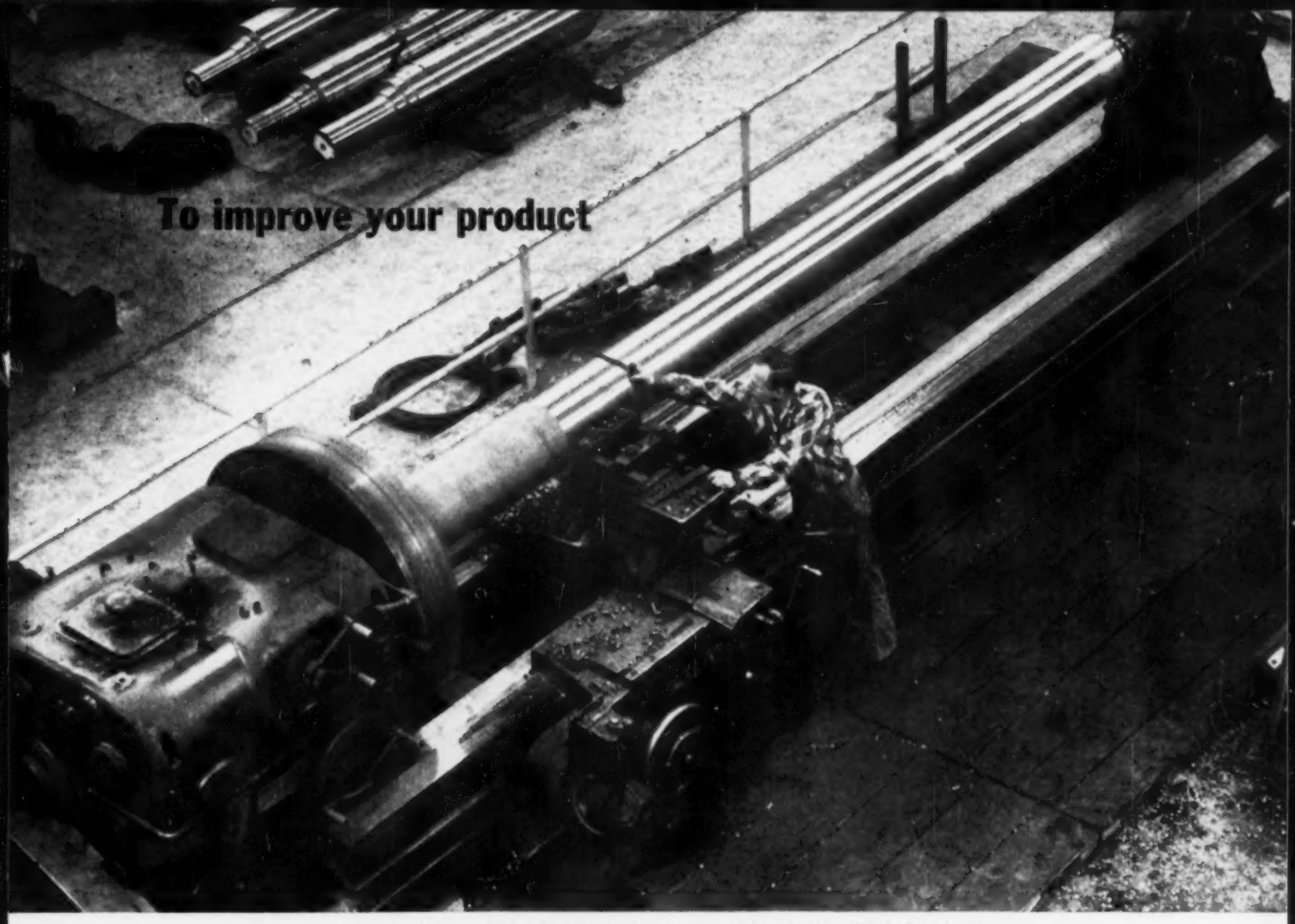
NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture.



ALCO machinist checks dimension on press shaft at forging plant in Latrobe, Pa.

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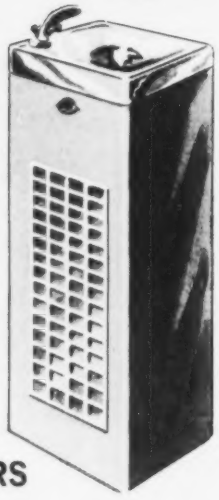

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You're getting a better piece of equipment if it carries Oakite CrysCoat protection. It means the product has been given a paint-bonding phosphate coating before painting by the quality-conscious manufacturer. This is important to you because it means that the product is protected against the spread of rust and the peeling of paint should the finish become accidentally damaged.

Next time you purchase fans, desks, water coolers, steel lockers, lighting fixtures and similar painted equipment, investigate those with CrysCoat protection. They'll look better, last longer. For the CrysCoat story write Oakite Products, Inc., 30H Rector Street, New York 6, N. Y.

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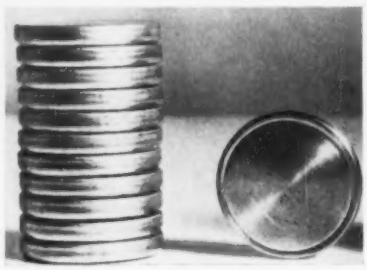
a bevel gear. Simply inserting and rotating a wheel wrench turns the pinion gear. To prevent any accidental loosening, a spring-loaded locking pawl drops into position as the removable wheel wrench is withdrawn from the gear's socket. A beveled collar on the wheel wrench shaft slips under and raises the pawl from the locked position when inserted. Punch clamps come in two sizes, 10 and 15-ton capacities. A minimium of four clamps is recommended for each press slide. These clamps can be installed on virtually any press — old, new, double action, etc. (Clearing Machine Corp.)

For more data circle No. 50 on postcard, p. 113

Electric Battery

Only slightly larger than a half dollar, these hermetically sealed, nickel-cadmium button cells come in either the 0.25 or 0.5 milliampere size. The cells can be stacked to achieve a battery of any desired voltage. Each cell is 1.2 volts.

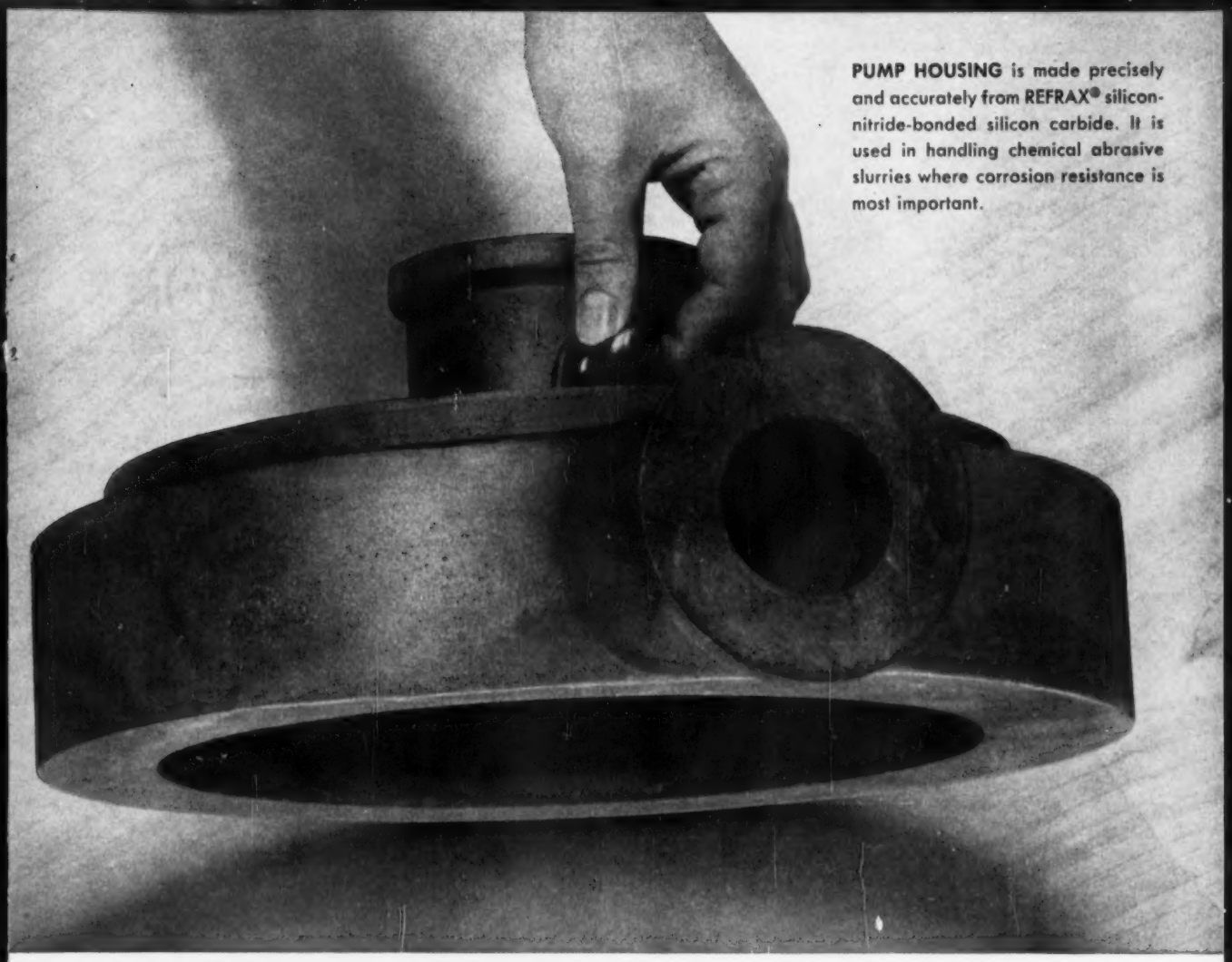


They are permanently rechargeable. The button cells have approximately the same voltage as ordinary dry cell batteries used in flashlights. However, they are some 12 times smaller. (Gulton, Industries, Inc.)

For more data circle No. 51 on postcard, p. 113

Positioner

Loads of over 1000 lb can be safely handled by a new positioner and assembly stand. Adaptable to a number of uses, the stand features a universal adapter plate to which any type fixture can attach. This permits use of the stand as a weld-



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What material combines *all* the following properties? Corrosion resistance so that it is not wet by molten aluminum, and resists attack by most acids; abrasion resistance that prevents wear by both high velocity particles and sliding heavy masses; the ability to withstand temperatures to 3000° F; hot strength so high that at 2450° F its modulus of rupture is 5600 psi?

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- ☐ Reprint of article in Product Engineering, Feb. '57 entitled "Nitride-bonded silicon-carbide bridges gap between metals and ceramics".
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ing positioner and assembly stand for heavy industrial items. It can also adapt to equipment maintenance and service shops. With its rugged, modern tubular design, the stand employs a "sure control" gear head. This allows a 360° revolution of the part held on the stand. (K. R. Wilson, Inc.)

For more data circle No. 52 on postcard, p. 113

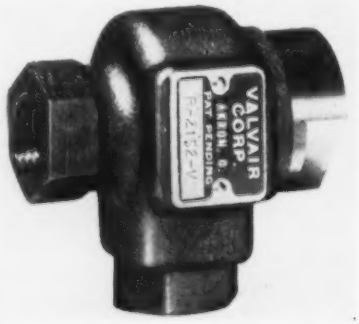
Portable Shed

Portable "houses" that one man puts up in an hour can save time and effort on many jobs. These prefabricated buildings act as a field office, tool shed, temporary office for use during plant expansion, etc. Of lightweight marine plywood 3-ft panels, the structure dismantles quickly. Broken-down, it fits into a pickup truck for quick transit to a new site. It can be enlarged to almost any length and width by adding 3-ft modules. When necessary, the building can be just as easily reduced in size. When constructing one, you can forget about cranes, skids, winches, and other heavy equipment usually associated with building a field structure. And if this isn't enough, you don't have to buy them; you can rent them. Of course, the buildings are for sale also. (Porta House Co.)

For more data circle No. 53 on postcard, p. 113

Valve

A new directional valve affords instant switch-over from automatic to manual control of diaphram-operated valve, cylinders and similar devices. The new valve, installed



as a tee in the inlet lines, permits manual take-over from automatic control, or control from two different sources, whenever desired. It also can be used to prevent intermixing of supply when two gases or liquids are being delivered alternately to a tank or container. Completely automatic in operation, the directional valve can be substituted for a dual top valve, its maker says. (Valvair Corp.)

For more data circle No. 54 on postcard, p. 113

Automated Oven

Designed to serve automated lines, a unique type oven employs a continuous conveyor belt. This belt carries the product through the heated zone; it can be arranged for both automatic loading and unloading. The unit can be used for drying, baking, baking-on finishes, etc. It's gas fired, with a 1,000,000-Btu burner. This has a 450°F maximum temperature. The continuous belt is 36-in. wide, driven by an

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In a split second, an arresting hook made of Crucible Hy-Tuf® stops a jet dead in its tracks. No other alloy can meet this particular aircraft's needs so well. And Hy-Tuf does it because it was developed by Crucible specifically for aircraft landing gear, hooks, and other such tough applications. Hy-Tuf is covered by AMS-6418B and MILS-7108.

Now other fields are benefiting from Hy-Tuf's tensile strength of over 230,000 psi. By taking advantage of its high strength and high toughness, cross section can be reduced to save weight. This means savings on a variety of applications from heavy-earth-moving equipment to power tools . . . power-driven garden tools . . . and all types of portable motors where a high strength-weight ratio is important.

Furthermore, special *tools* and *shafts* are logical applications for Hy-Tuf when weight and cross-sectional dimensions must be limited. Where such limitations do not permit sufficient fillet or radius for standard alloys, a higher impact and less notch sensitive alloy, such as Hy-Tuf, is needed.

Ask for data about Hy-Tuf or other ultra high strength steels which may meet your needs more closely.

Write to Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.

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Expert W-L metallurgists will help you choose the right stock for the job.

Write our Cambridge office today for your *free* Wheelock, Lovejoy Data Sheets. They'll give you complete technical information on grades, applications, physical properties, tests, heat treating, etc.

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electric motor. Belt speed adjusts from two to 10 fpm. Inside dimensions of the baking chamber are: 38-in. wide x 24-in. high x 15 ft long. Overall height: 11-ft 6 in. (Grieve-Hendry Co., Inc.)

For more data circle No. 55 on postcard, p. 113

Strip Threader

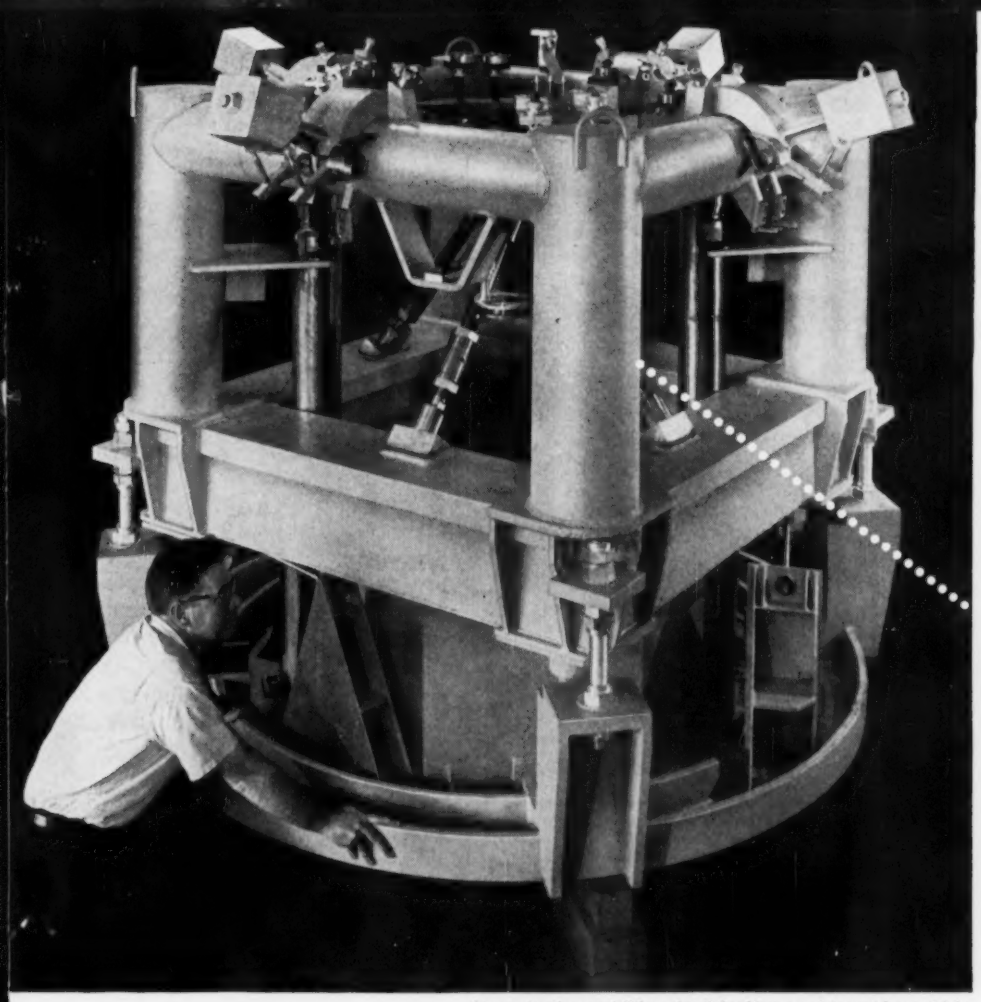
Coil driving and stripping units now available make it possible for one man to thread heavy gage lines rapidly. Gages up to 0.500-in. thick by 75-in. wide can be threaded, including cropping of the strip end, in 30 to 45 seconds. This equipment works with pickle lines, annealing and pickling lines, gal-

vanizing lines, trimming lines, slitting and coiling lines, pipe mills, and rolling mills where threading time and manpower are critical. For continuous lines, this saving in time means shorter storage loops are possible. Coil driving and stripping units apply to cone unwinds, mandrel unwinds, or coil boxes. All controls are remote, using hydraulic power for linear motions and electric motors for rotating parts. (Stamco, Inc.)

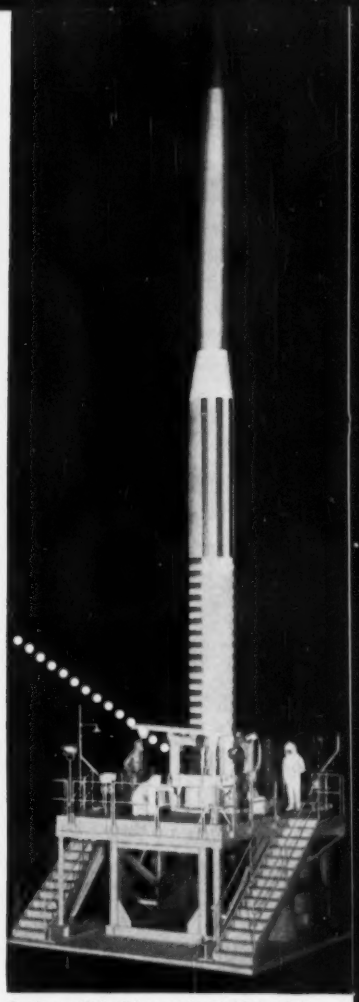
For more data circle No. 56 on postcard, p. 113

Eccentric Press

Producing a large variety of stampings is this 500-ton four-point eccentric press. Featuring an air-operated, electrically controlled drum-type clutch, the press has a 24-in. stroke and a 15-in. adjustment. Shut-height is 61½-in. Both



Loewy testing and firing stand for Vanguard launching vehicle.



Scale model of Loewy launching platform and rocket stand and the Martin Company's Vanguard rocket. (On display for the duration of the Geophysical Year at the IBM Vanguard Computing Center, Washington, D.C.)

Loewy plays vital role in 3 major rocket and missiles projects . . .

VIKING VANGUARD SHAKER

Three important rocket and missiles projects have drawn upon the outstanding engineering skills of Loewy-Hydropress. For "Project Shaker," Loewy designed and is now constructing an enormous simulator to duplicate ship motions. The launching platform which Loewy created primarily for Vanguard first proved its effectiveness in firing and launching several of the Viking rockets. But it is Vanguard, certainly the most significant undertaking in the history-making International Geophysical Year, that is particularly noteworthy at this time.

A few days prior to the start of the IGY our testing and firing stand, heart of our installation, was erected on top of the launching platform at Cape Canaveral, Fla. Remarkably sensitive and accurate, it will share the responsibility with the Martin Company's Vanguard for placing the instrument-packed satellite in its earth-circling path.

The functions of the testing and firing stand are multivarious. It anchors the rocket exactly in its vertical position, helps support it under wind loads, weighs it and its liquid fuel while fueling takes place, supports its first-stage engine, measures its tremendous thrust and, finally, at the moment of firing, releases it skyward.

Loewy-Hydropress specializes in static and flight firing structures, test stands, shipboard launchers, and ship motion simulators. For these projects, as for all our undertakings, the vast facilities of our parent company, Baldwin-Lima-Hamilton, are entirely at our disposal. Including Loewy, five B-L-H divisions are suppliers to missiles or rocket projects.

It is likely that your work in these fields can benefit from our skills and experience. Why not write to our Missiles Section, Dept. A-9.

Loewy-Hydropress Division

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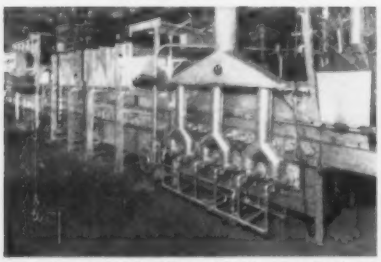
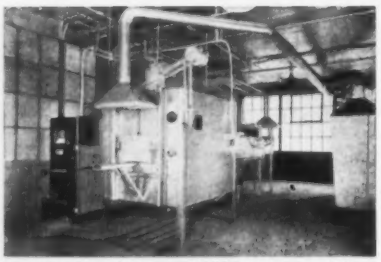
EF FURNACES for Sintering Metal Powder Products



A large capacity EF combination gas fired radiant tube and electrically heated roller hearth type furnace for sintering metal powder parts at temperatures up to 2050°F.



A comparatively small EF hand operated pusher type electric furnace suitable for experimental work and small production runs on both ferrous and non-ferrous products.

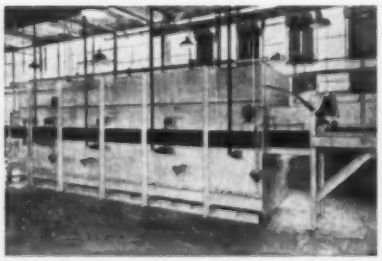
EF furnaces for processing ferrous and non-ferrous powder products assure:

1) lowest cost per pound for the sintering operation.
2) maximum uniformity of size for the sintered products.
3) maximum pounds of quality product per dollar of investment.

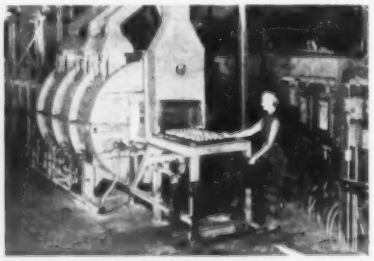
Long experience with special atmospheres, metal powders, bonding powder to strip and all heat processing phases connected with powder metallurgy has enabled EF engineers to develop and install equipment for producing some rather outstanding results.

With our extensive experience and complete manufacturing facilities we are in position to build the size and type equipment to best suit your specific requirements.

We would like to discuss our latest developments with you, if interested.



Fusing metal powder to strip. Metal powder is being fused on six separate strands of metal strip, simultaneously and continuously, in this EF roller hearth type furnace.



An EF gas fired muffle type continuous furnace—another of the numerous type we build for sintering non-ferrous and iron powder products at temperatures up to 2050° F.

BULLETIN No. 461

shows typical installations of EF Gas-fired, Oil-fired and Electric Furnaces.

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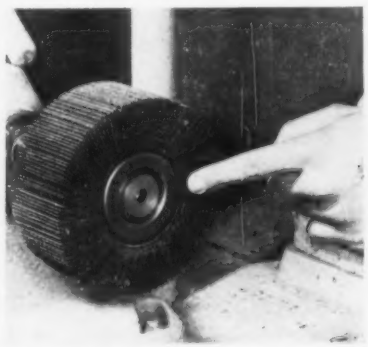
NEW EQUIPMENT

bed and slide have an area of 72 x 144 in. By modifying various dimensions such as stroke, slide adjustment, bed and slide areas, the four-point press design covers an almost unlimited range. It stamps metal of almost any thickness from light sheet to heavy plate. (The Cleveland Punch & Shear Works Co.)

For more data circle No. 57 on postcard, p. 113

Finishing Wheels

Disposable flanges and a design that permits flash sanding are two key features of a new line of small coated abrasive wheels. These wheels are for both grinding and polishing. The new disposable flanges lock the wheel's coated abrasive leaves securely in place.



They are factory installed and bonded to the core. This construction technique makes it unnecessary to remove the flanges when a wheel change is required; it's simply a matter of slipping one wheel on the spindle and tightening the cap nut. (Minnesota Mining & Mfg. Co.)

For more data circle No. 58 on postcard, p. 113

Heat-treat Furnace

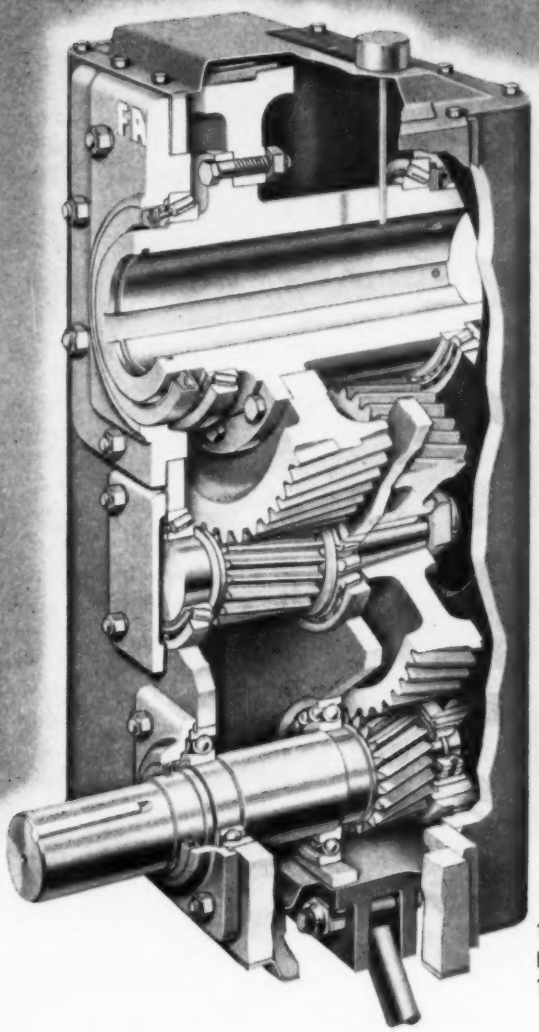
Of extremely large capacity, a new vacuum heat-treating furnace measures 99-in. diam x 10-ft deep. It accommodates a 55½-in. diam x 10-ft 7-in. deep retort. Featuring an effective working zone of 55½-in. x 9-ft, the furnace reaches to 2200°F (±5°) with vacuum of 1/10 of one micron. (Hollywood Heat Treating Co.)

For more data circle No. 59 on postcard, p. 113

New...LARGER...ALL-STEEL!

–the FALK 315J Shaft Mounted Drive

- **for higher horsepower**
- **for lower output speeds**



THE NEW 315J...
FROM 2 HP AT 5 RPM
TO 50 HP AT 359 RPM

Check These Features

New — 3-wall, one-piece housing provides double the ability of cast iron to withstand external impact or shock loads.

New — ratio range—5:1, 14:1 or 25:1. Higher ratio range makes possible lower output speeds...smaller sheaves...standard, rather than slow-speed, motor.

New — ease of maintenance. All revolving elements can be easily replaced in the field, on the jobsite! Inspection covers permit quick inspection of gears and bearings. Dipstick provides quick check on lubricant.

New — longer center distance between shafts allows use of larger sheave on input shaft. Unit may be mounted with input shaft next to driven machine, and with motor mounted directly under driven shaft.

PROMPT DELIVERY

Standard units are available for off-the-shelf shipment from factory, warehouse or distributor stock.

LET US HELP YOU

Your Falk Representative or Authorized Falk Distributor will gladly review your applications and offer suggested selections—without obligation.

Write for Bulletin 7100

The new Falk 315J also gives you these famous Falk advantages—

- Falk extra-depth, extra-capacity gear teeth—plus the extra efficiency (98½% per gear mesh) of helical gears for maximum power utilization.
- Through-hollow shaft design for easy installation, with internal groove to permit use of bearing puller when dismounting unit. Hollow shaft also permits use of unit on through-shaft applications.
- Tie rod fastened to steel housing by steel bracket with bolt in double shear. Shock load on tie rod will not damage housing.

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Representatives and Distributors in Most Principal Cities

Manufacturers of Quality Gear Drives and Flexible Shaft Couplings

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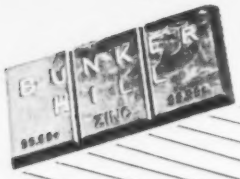

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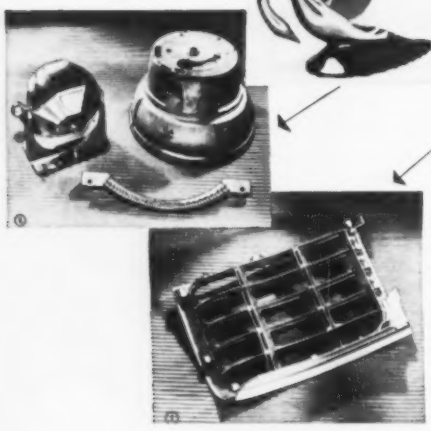

YOU CAN'T GO WRONG on any of these three counts:

DIE-CASTING as the forming method offers numerous mechanical and economic advantages over other methods of manufacture.

ZINC as the base metal produces die-castings with property values superior to those of the other die-casting metals in many categories.

BUNKER HILL, the pioneer and still a leading producer of 99.99+% high purity zinc, provides the die-caster with exceptionally pure zinc, the best available.

The American Zinc Institute, 60 East 42nd Street, New York 17, New York, has available a very interesting 28-page brochure, "Die-Casting-Molten Metal to Finished Part—Direct." We suggest that you send for it. It contains helpful technical information.

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The Iron Age Summary

Steel Reaches Turning Point

"Wait until September" has been a by-word in steel for some months. And not all the waiting has been optimistic.

Orders now coming in indicate a strengthening market, reaching its peak in late fall.

▪ The looked for "after Labor Day" upturn in steel is under way. The upward trend has started and will expand further this month. It will reach a peak late in November or early in December.

Much of the strength comes from new orders for automotive steel. But there has also been an expansion in volume of orders from miscellaneous sources, always a good sign.

Based on market conditions observed in the past few days, it can be predicted:

Improvement in steel activity is now building up. The wide variation in operating rates among companies is now beginning to contract. By October, most firms will be on a comparable footing.

Auto firms have worked off substantial inventories. They will be active in the sheet and strip market for more steel than they took a year ago at the start of new model runs.

Widespread pessimism because of defense cutbacks and stretchouts will not hit steel as much as other materials. The amount of steel going directly or indirectly into defense programs has not been large.

Deliveries Will Slow — Users other than automakers are paying some attention to the warning signs from their suppliers. The word is that although there will be no serious shortages, there will be trouble getting fast deliveries, even on flat-rolled steel, around the end of October.

Steel firms whose operations have been heavily depressed by the dearth of sheet and strip orders are feeling a little better. Their field offices are beginning to send in the long sought auto business.

Midwestern mills, for example report the automakers are coming into the market heavily with October sheet orders. Activity stepped up as last month drew to a close.

Looking ahead, the market will be stronger in a month than it is this week. Substantial strength is looming in hot and cold-rolled sheets, plates, structurals and a renewed demand for oil country pipe.

Almost a Record—The better-than-expected support to the steel rate over the past two months suggests the industry will approach 116.5 million tons this year—just short of the 117 million ton record made in 1955.

In spite of the encouraging market news from the steel industry, scrap appears to be breaking downward. Industrial lists in Pittsburgh are off $5 to $7 from a month ago. The IRON AGE dealer scrap composite dropped $1.33 per ton.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	2,164	2,138	2,010	2,437
Ingot Index				
(1947-1949=100)	133.8	133.0	125.1	151.7
Operating Rates				
Chicago	82.0	83.0*	84.0	101.0
Pittsburgh	84.5	84.0	85.0	98.0
Philadelphia	92.0	91.0	99.0	105.0
Valley	75.5	74.0*	61.0	95.0
West	100.0	100.0	102.0	98.0
Buffalo	100.0	98.0	89.0	107.0
Cleveland	82.0	89.0	80.0	99.0
Detroit	88.0	88.0	98.0	97.0
S. Ohio River	86.0	87.0*	76.0	90.0
South	85.0	85.0	93.0	93.0
Upper Ohio R.	93.0	94.0*	73.5	99.0
St. Louis	77.0	77.0	80.0	95.0
Northeast	37.0	37.0	66.5	100.0
Aggregate	84.5	83.5	78.5	99.0

*Revised

Prices At a Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.967	5.967	5.967	5.622
Pig Iron (Gross ton)	$66.42	$66.42	$66.40	$63.04
Scrap, No. 1 hvy (Gross ton)	$50.17	$51.50	$53.83	$58.50
Nonferrous				
Aluminum ingot	28.10	28.10	28.10	27.10
Copper, electrolytic	28.50	28.50	29.25	40.00
Lead, St. Louis	13.80	13.80	13.80	15.80
Magnesium ingot	36.00	36.00	36.00	35.25
Nickel, electrolytic	74.00	74.00	74.00	64.50
Tin Straits, N. Y.	93.00	93.375*	95.375	99.875
Zinc, E. St. Louis	10.00	10.00	10.00	13.50

*Revised

Price Rise Coming for Bearings

Most companies are expected to announce increases within the next few weeks.

But there is no problem getting any kind of bearing you want in quantity.

A pickup in machine tool demand would tighten deliveries.

▪ Fast action may save you money on bearings. A general price increase is definitely in the works for early fall. One company will post new prices Oct. 1, and others should have lists ready about the same time.

Bearing business has been soft in recent weeks for most lines. Manufacturers point to summer vacations and automotive model changeovers as major causes. Sales to machine tool builders and capital goods producers generally have been off for some time. But the outlook for the next 6 months is definitely stronger.

"Demand for anti-friction bearings for the next six months will depend entirely on the activity of the heavy durable goods industry," says W. F. Shotola, sales manager, Bantam Bearings Div., Torrington Co., South Bend, Ind.

Fourth Quarter Hopes—General Motors' Hyatt Bearing Div. expects fourth quarter sales at least as good as the last period of '56 and maybe better. This company looks for stronger business with Detroit during the balance of the year.

Timken Roller Bearing Co. concurs, adds it has high hopes for demand from the construction industry as the roadbuilding program gets rolling. But Timken looks for continuing softness in business with machine tool firms.

Ample Capacity —Torrington Co. underscores softness in capital goods generally and sees little early improvement in aircraft industry sales. But Torrington is optimistic over business with consumer goods producers.

All companies queried report ample capacity to meet any foreseeable demand. The industry generally has no immediate plans for expansion, although Timken is pointing with pride to its new railroad bearing facility at Columbus, O., and a new overseas plant at Ballarat, Australia.

More Improvements—The raw material outlook is good. Industries report wide availability of bearings in all lines. "No problem except price," comments Donald E. Lewis, Torrington Bearing Div. general manager.

Timken speaks for the industry when it points out that product developments and refinements are continuing programs rather than individual projects. Torrington calls special attention to its work on high temperature bearings and future work on its miniature needle bearing line. The company is also doing concentrated follow-up design and application improvements on its recently-announced needle thrust and drawn cup roller bearings.

Expect Moderate Hikes—With good sales prospects, ample capacity, and raw materials supplies, the bearings business should remain good throughout the winter. A pickup in capital goods demand—particularly machine tools—might tighten deliveries but should not seriously affect overall supply.

The extent of forthcoming higher prices has not been specified yet, but buyers do not expect boosts to be overly steep. Fast action now, however, could mean savings for alert buyers.

RACEWAY: Technicians at New Departure Div. General Motors, assemble small bearings into their raceways. These miniatures, as well as their king-sized cousins, are going to cost more in another month or so.

3

3

three reasons why it will pay you to use

Federated

NICKEL ALLOY INGOT

1. **CONVENIENCE** of handling ingot instead of scrap is obvious. But in addition, while ingot costs a little more, you SAVE—on costs of handling, on space for handling and storing, on melting losses.

2. **UNIFORM ANALYSIS** — The analysis of nickel alloy ingot is always more uniform than that of a heterogeneous mixture of scrap. With Federated ingot, you don't take chances on possible contamination of heats.

3. **AVAILABILITY** — Federated Nickel alloy ingot is available for immediate use. Fast, dependable Federated service gets nickel to you when you need it.

This new Nickel alloy ingot is backed by the same thorough research and product development, and embodies the same high quality that has marked the whole line of products Federated has supplied to the steel industry for over 40 years . . . babbitts for bearings, Terne metal for plate, zinc alloys for galvanizing, ferro-selenium for stainless steel, and lead pellets for free-machining steel.

Why not get in touch with us today and learn more about why it will pay you to do business with Federated.

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STEEL PRODUCT MARKETS

Sheet Mills Go On Rolling Plate

Bookings of continuous mill light plate are taken despite sheet-strip pickup.

With more capacity to keep busy, the flat-rolled mills are welcoming the plate orders.

▪ Rolling of light plate orders on continuous mills will probably continue as long as customers want it.

There are several reasons why, despite the flat-rolled pickup, it won't fade completely away. For one thing, the sheet-strip improvement is a gradual, rather than an overnight change. Light plate schedulings help the mills fill out their order books.

Another factor is the recent expansion in sheet mill facilities which means producers can accommodate more sheet-strip orders. If they don't materialize as hoped for, the light plate rollings help keep operating rates up.

Change in Plans — Midwestern mills, for example, had to abandon plans to drop light plate rolling late this quarter or early in the next. The expected strip bookings didn't come through in heavy enough volume. Now some strip mill plate will probably be rolled right through the balance of the year.

Cleveland area sheet mills are continuing to round out rolling schedules with orders for cut length light plate. With the expansion of sheet capacity in that area, light plate rolling is being welcomed.

Plates and Shapes—Plate in narrower widths and thicknesses has improved in supply largely because of light plate rolling by continuous mills in view of slack on sheet and strip orders. However, the heavier and wider product is still on allotment with mill carryovers and quota cuts reported in some markets. **Chicago** producers say out-of-the-area suppliers are reducing shipments into the area. A **Philadelphia** area mill reports getting heavy plate inquiries from **Chicago.** A large **Eastern** fabricator indicates the plate and structural market is still tight, although fewer jobs are now coming on the market for bid. Premium prices are being offered, without much success, in the **Midwest** to coax out some structural shapes. Foreign supplies of light shapes are still welcomed there. **Western** mill supplies of structurals are now believed ample for the market.

Pipe and Tubing—Inventory readjustment on the part of consumers is having an effect on the market. Although mills continue allocating seamless tube, a few tonnages are starting to float around. Usually it's quickly grabbed up when offered to other users. However, sometimes it's turned down again as delivery time approaches with the need for mills to re-sell it. Midwestern mills, for example, have taken a number of fourth quarter cutbacks from large consumers and some third quarter cancellations. Mills are apparently making an effort to reduce their inventories. The relative market lag is blamed on these fat mill inventories, as well as a reduction in oil well drilling, and the impact of tight money on buying.

Bar — Hot-rolled ordering for August is running ahead of July levels. Warehouse buying in several areas is a factor in the improvement. However, cold finished bars remain slow with standard sizes still available in many cases right off the shelf. Cold finishers don't look for any pickup until there's stronger buying action on the part of the auto producers.

Wire Products — Although the order intake picture has improved a little, delivery on standard items is usually still only a matter of a few weeks. Some producers report August intake double that of July. However that month was one of the poorest in recent years. Mills indicate there's virtually no future ordering on the part of customers.

Tinplate—Production of tinplate continues to exceed shipments as it has since the end of April. The resulting inventory buildup plus increasing electrolytic capacity will probably mean a 15-20 pct reduction in fourth quarter production. Closer inventory control on the part of can companies and crop failures in the **East** are other depressing forces. One large **Delaware Valley** canner expects to get in about 75 pct of the normal expected tomato harvest and that percentage is above the general average for the region. **Chicago** tinplate producers are concerned because capacity over the past three years has surpassed demand.

Sheet and Strip—Pickup in automotive ordering of cold-rolled sheet is improving the market, although the pace is far from breakneck. October tonnages will top September, which showed improvement over August.

PURCHASING AGENT'S CHECKLIST

Titanium producers out to find more commercial users. **P. 71**

Magnesium market, unlike other non-ferrous metals, moves along at a healthy clip. **P. 73**

Another in the "More for Your Metalworking Dollar" series on copper and its alloys. **P. 115**

COMPARISON OF PRICES

(Effective Sept. 3, 1957)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in **Heavy Type**; declines appear in *Italics*.

	Sept. 3 1957	Aug. 27 1957	Aug. 6 1957	Sept. 4 1956
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.925¢	4.925¢	4.925¢	4.675¢
Cold-rolled sheets	6.05	6.05	6.05	5.75
Galvanized sheets (10 ga.)	6.60	6.60	6.60	6.30
Hot-rolled strip	4.925	4.925	4.925	4.675
Cold-rolled strip	7.17	7.17	7.17	6.870
Plate	5.12	5.12	5.12	4.87
Plates, wrought iron	13.15	13.15	13.15	10.40
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	47.50
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$10.30	$10.30	$10.30	$9.85
Tin plates, electro (0.50 lb.)	9.00	9.00	9.00	8.55
Special coated mfg. ternes	9.55	9.55	9.55	9.10
Bars and Shapes: (per pound)				
Merchant bar	5.425¢	5.425¢	5.425¢	5.075¢
Cold finished bars	7.30	7.30	7.30	6.85
Alloy bars	6.475	6.475	6.475	6.125
Structural shapes	5.275	5.275	5.275	5.00
Stainless bars (No. 302)	45.00	45.00	45.00	40.75
Wrought iron bars	14.45	14.45	14.45	11.50
Wire: (per pound)				
Bright wire	7.65¢	7.65¢	7.65¢	7.20¢
Rails: (per 100 lb.)				
Heavy rails	$5.525	$5.525	$5.525	$5.075
Light rails	6.50	6.50	6.50	6.00
Semifinished Steel: (per net ton)				
Rerolling billets	$77.50	$77.50	$77.50	$74.00
Slabs, rerolling	77.50	77.50	77.50	74.00
Forging, billets	96.00	96.00	96.00	91.50
Alloy blooms, billets, slabs	114.00	114.00	114.00	107.00
Wire Rod and Skelp: (per pound)				
Wire rods	6.15¢	6.15¢	6.15¢	5.80¢
Skelp	4.875	4.875	4.875	4.225
Finished Steel Composite: (per pound)				
Base price	5.967¢	5.967¢	5.967¢	5.622¢

	Sept. 3 1957	Aug. 27 1957	Aug. 6 1957	Sept. 4 1956
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	70.51	$70.51	$70.38	$67.76
Foundry, Valley	66.50	66.50	66.50	63.00
Foundry, Southern Cin'ti	71.65	71.65	70.67	67.17
Foundry, Birmingham	62.50	62.50	62.50	59.00
Foundry, Chicago	66.50	66.50	66.50	63.00
Basic, del'd Philadelphia	70.01	70.01	69.88	66.84
Basic, Valley furnace	66.00	66.00	66.00	62.50
Malleable, Chicago	66.50	66.50	66.50	63.00
Malleable, Valley	66.50	66.50	66.50	63.00
Ferromanganese, cents per lb‡	12.75¢	12.75¢	12.75¢	10.75¢

74 to 76 pct Mn base.

Pig Iron Composite: (per gross ton)				
Pig iron	$66.42	$66.42	$66.40	$63.04
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	*$52.50*	$53.50	$55.50	$58.50
No. 1 steel, Phila. area	50.50	50.50	51.50	58.50
No. 1 steel, Chicago	*47.50*	50.50	54.50	58.50
No. 1 bundles, Detroit	*46.50*	50.50	50.50	55.50
Low phos., Youngstown	55.50	55.50	58.50	65.50
No. 1 mach'y cast, Pittsburgh	59.50	59.50	58.50	60.50
No. 1 mach'y cast, Philadel'a	56.50	56.50	56.50	58.00
No. 1 mach'y cast, Chicago	*50.50*	53.50	53.50	59.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	*$50.17*	$51.50	$53.83	$58.50
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$15.38	$15.38	$15.38	$14.50
Foundry coke, prompt	$17.50-$19	$17.50-$19	$17.50-$19	$17.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	28.50	28.50	29.25	40.00
Copper, Lake, Conn.	28.50	28.50	29.25	40.00
Tin, Straits, N. Y.	*93.00*†	93.375*	95.375	99.875
Zinc, East St. Louis	10.00	10.00	10.00	13.50
Lead, St. Louis	13.80	13.80	13.80	15.80
Aluminum, virgin ingot	28.10	28.10	28.10	27.10
Nickel, electrolytic	74.00	74.00	74.00	64.50
Magnesium, ingot	36.00	36.00	36.00	35.25
Antimony, Laredo, Tex.	33.00	33.00	33.00	33.00

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Averages of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

←To identify producers, see Key on P. 175→

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	.....
Birmingham *R3*	62.00	62.50*	.....	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	.....
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	66.50	67.00	67.50	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Everett *M6*	66.50	67.00	67.50	.....	.....
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Sharpsville *S3*	66.00	66.50	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	.....	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	.....
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	74.00
Youngstown *Y1*	.....	.....	66.50	67.00	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos. † Intermediate low phos. Add $1.00 for 0.31 to 0.50 pct phos.

Silvery iron: Buffalo (6 pct), *H1*, $78.50; Jackson, *J1*, *I4* (Globe Div.), $77.25; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $103.50; (15.51-16.00), $106.50. Add $1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 18 pct. Add $1.25 for each 0.50 pct manganese over 1.00 pct. Bessemer silvery pig iron (under .10 pct phos.): $64.00. Add $1.00 premium for all grades silvery to 18 pct.

STAINLESS STEEL

Base price cents per lb f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.00	23.75	23.25	25.25	—	27.00	39.75	32.25	37.00	—	16.75	—	17.00
Slabs, billets	27.00	27.00	28.00	31.50	32.00	33.25	49.50	40.00	46.50	—	21.50	—	21.75
Billets, forging	—	36.50	—	38.00	41.00	40.50	62.25	47.00	55.75	32.00	28.25	28.75	28.75
Bars, struct.	42.00	43.00	44.25	45.00	48.00	47.75	73.00	55.50	64.75	37.75	33.75	34.25	34.25
Plates	44.25	45.00	46.25	47.25	—	50.75	76.75	59.75	69.75	40.25	35.00	—	36.00
Sheets	48.50	49.25	51.25	52.00	—	55.50	81.50	65.50	79.25	—	40.25	—	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	44.25	69.25	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	—	55.50	81.50	65.50	79.25	48.25	40.25	—	40.75
Wire CF; Rod HR	—	40.75	42.00	42.75	45.75	45.50	69.50	52.50	61.50	36.00	32.25	32.75	32.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11*; Brackenridge, Pa., *A3*; Butler, Pa., *A7*; Vandergrift, Pa., *U1*; Washington, Pa., *W2*, *J2*; Baltimore, *E1*; Middletown, O., *A7*; Massillon, O., *R3*; Gary, *U1*; Bridgeville, Pa., *U2*; New Castle, Ind., *I2*.

Strip: Midland, Pa., *C11*; Waukegan, Cleveland, *A5*; Carnegie, Pa., *S9*; McKeesport, Pa., *F1*; Reading, Pa., *C2*; Washington, Pa., *W2*; W. Leechburg, Pa., *A3*; Bridgeville, Pa., *U2*; Detroit, *M2*; Canton-Massillon, O., *R3*; Harrison, N. J., *D3*; Youngstown, *J3*; Sharon, Pa., *S1*; Butler, Pa., *A7*; Wallingford, Conn., *U3* (plus further conversion extras); *W1*; New Bedford, Mass. (.25¢ per lb higher), *R6*; Gary, *U1* (.25¢ per lb higher).

Bar: Baltimore, *A7*; S. Duquesne, Pa., *U1*; Munhall, Pa., *U1*; Reading, Pa., *C2*; Titusville, Pa., *U2*; Washington, Pa., *J2*; McKeesport, Pa., *U1*, *F1*; Bridgeville, Pa., *U2*; Dunkirk, N. Y., *A3*; Massillon, O., *R3*; S. Chicago, *U1*; Syracuse, N. Y., *C11*; Watervliet, N. Y., *A3*; Waukegan, *A5*; Canton, O., *T5*, *R3*; Ft. Wayne, *I4*; Detroit, *R5*; Gary, *U1*.

Wire: Waukegan, *A5*; Massillon, O., *R3*; McKeesport, Pa., *F1*; Ft. Wayne, *J4*; Harrison, N. J., *D3*; Baltimore *A7*; Dunkirk, *A3*; Monessen, *P1*; Syracuse, *C11*; Bridgeville, *U2*.

Structurals: Baltimore, *A7*; Massillon, O., *R3*; Chicago, Ill., *J4*; Watervliet, N. Y., *A3*; Syracuse, *C11*; S. Chicago, *U1*.

Plates: Brackenridge, Pa., *A3*; Chicago, *U1*; Munhall, Pa., *U1*; Midland, Pa., *C11*; New Castle, Ind., *I2*; Middletown, *A7*; Washington, Pa., *J2*; Cleveland, Massillon, *R3*; Coatesville, Pa., *C15*; Vandergrift, Pa., *U1*; Gary, *U1*.

Forgings billets: Midland, Pa., *C11*; Baltimore, *A7*; Washington, Pa., *J2*; McKeesport, *F1*; Massillon, Canton, O., *R3* Watervliet, *A3*; Pittsburgh, Chicago, *U1*; Syracuse, *C11*; Detroit, *R5*; Munhall, Pa., S. Chicago, *U1*.

Market Slide Gains Momentum

Steelmaking grades are being offered at $2 below last week in some markets.

There is little optimism voiced for September. Mills substitute pig iron.

▪ Prices tumbled again in most major markets. While dealers hope it is the last dip before the expected seasonal upturn in mill operating rates, the September outlook is not exactly encouraging.

For one thing, a number of mills throughout the country have shut down some of their steelmaking furnaces but are keeping blast furnaces going at full tilt. This means less scrap in open hearth charges.

In Pittsburgh, the whole market seems to have loosened. Railroad specialties are down sharply as an influx of billet and bloom crops has wiped out the shortage of these grades. For the first time in months, Pittsburgh brokers are able to draw specialty scrap grades from the East Coast.

Export is dying out in all markets save Philadelphia, where cargo loadings are scheduled during the entire month. Thanks to foreign buying, the price of steelmaking grades held firm in that port. But declines in Pittsburgh and Chicago sent The IRON AGE Composite down $1.33 to $50.17.

Pittsburgh — Prices of most grades are off $1 based on the sharp drop in industrial lists, sales of secondary openhearth scrap at lower figures, and the continued lack of mill demand. The abundance of iron in the form of pig and synthetic scrap has been a big factor in reducing mill buying of dealer scrap. In the only mill buying of dealer grades, small tonnages of No. 2 bundles have been sold for $44.

Chicago—Following an eleventh hour "stop shipment" order in the area, hard on the heels of a report that another major consumer planned no strong purchasing for September, prices here hit a downward skid. No. 2 steelmaking grades were hardest hit, but even premium grades began to slide sharply in a movement that was picking up speed as the Labor Day week end began.

Philadelphia — Export is still propping up prices in this market. Unless consumers pop into the domestic market unexpectedly, the September picture is pretty gloomy. Two local mills have a total of four openhearths shut down. Blast furnaces, meanwhile, are going full strength. A threatened labor strike might slow down activity in dealer yards. But since the mills aren't buying anyway, a strike would do little toward tightening supply.

New York—Temporary suspension of export buying by large brokers has pushed No. 1 heavy melting down $1 to a top of $49. Thus, No. 1 follows last week's decline in other steelmaking grades. One dealer estimates that exports are a $5-$6 prop for steelmaking grades at this time. But the trade expects heavier domestic buying this fall.

Detroit—Prices fell sharply here. Industrial lists fell $6-$7 from the previous month's listings, despite sharply reduced quantities offered by manufacturers. Local consumers are still well-stocked in bundles and are not expected to enter the dealer market for some time.

Cleveland — Auto lists sold at quoted levels, about $2 under a month ago. But the dealer market is still in the doldrums. A dropoff in Detroit lists corrected a situation in which northeastern Ohio auto bundles were being shipped there.

St. Louis—Purchases from outside markets halted and local prices dropped from $1 to $3. Mills are well-stocked with scrap. The price of random length rail last week was erroneously reported as $55-$56. Correct price was $65-$66.

Birmingham—A purchase by a major consumer dropped openhearth grades, and electric furnace grades immediately fell off in the same degree. Export is unusually dull and prices are down. Cast continues firm but some weakness may follow a softness in northern cast markets.

Cincinnati—This market is off $2 in anticipation of buying programs for area mills being announced this week. General tone is weaker, following a drop-off in industrial lists. Dealers generally have fair inventories.

Buffalo — There are no changes in any of the prices because this market is at a complete standstill. The tone is weak, however, and some dealers feel that the next purchase of steelmaking grades will be at slightly lower prices.

Boston — Weakness of this market is reflected in price declines for secondary steelmaking grades, electric furnace bundles, and turnings. Very little business was transacted in the face of the Labor Day week end. Export is inactive.

West Coast—Prices dropped $3 for No. 1 and No. 2 heavy melting in San Francisco, Los Angeles and Seattle. Due to the heat, little scrap is coming in to dealer yards.

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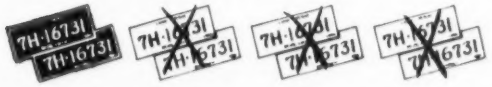

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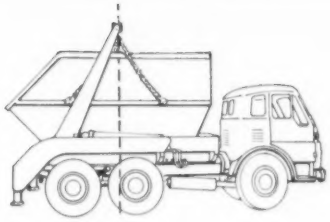

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SCRAP PRICES *(Effective Sept. 3, 1957)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$52.00 to $53.00
No. 2 hvy. melting	46.00 to 47.00
No. 1 dealer bundles	52.00 to 53.00
No. 1 factory bundles	59.00 to 60.00
No. 2 bundles	43.00 to 44.00
No. 1 busheling	52.00 to 53.00
Machine shop turn.	30.00 to 31.00
Mixed bor. and ms. turn.	30.00 to 31.00
Shoveling turnings	34.00 to 35.00
Cast iron borings	34.00 to 35.00
Low phos. punch'gs plate	59.00 to 60.00
Heavy turnings	47.00 to 48.00
No. 1 RR. hvy. melting	58.00 to 59.00
Scrap rails, random lgth.	71.00 to 72.00
Rails 2 ft and under	75.00 to 76.00
RR. steel wheels	69.00 to 70.00
RR. spring steel	69.00 to 70.00
RR. couplers and knuckles	69.00 to 70.00
No. 1 machinery cast.	59.00 to 60.00
Cupola cast.	49.00 to 50.00
Heavy breakable cast.	47.00 to 48.00

Chicago

No. 1 hvy. melting	$47.00 to $48.00
No. 2 hvy. melting	40.00 to 42.00
No. 1 dealer bundles	48.00 to 49.00
No. 1 factory bundles	54.00 to 55.00
No. 2 bundles	35.00 to 36.00
No. 1 busheling	47.00 to 48.00
Machine shop turn.	30.00 to 31.00
Mixed bor. and turn.	32.00 to 33.00
Shoveling turnings	32.00 to 33.00
Cast iron borings	32.00 to 33.00
Low phos. forge crops	60.00 to 61.00
Low phos. punch'gs plate	55.00 to 56.00
Low phos. 3 ft and under	54.00 to 55.00
No. 1 RR. hvy. melting	53.00 to 54.00
Scrap rails, random lgth.	63.00 to 64.00
Rerolling rails	71.00 to 72.00
Rails 2 ft and under	69.00 to 70.00
Locomotive tires cut	58.00 to 59.00
Cut bolsters & side frames	59.00 to 60.00
Angles and splice bars	62.00 to 63.00
RR steel car axles	72.00 to 73.00
RR couplers and knuckles	58.00 to 59.00
No. 1 machinery cast.	50.00 to 51.00
Cupola cast.	45.00 to 46.00
Heavy breakable cast.	43.00 to 44.00
Cast iron brake shoe	45.00 to 46.00
Cast iron wheels	52.00 to 53.00
Malleable	59.00 to 60.00
Stove plate	43.00 to 44.00
Steel car wheels	59.00 to 60.00

Philadelphia Area

No. 1 hvy. melting	$50.00 to $51.00
No. 2 hvy. melting	44.50 to 45.50
No. 1 dealer bundles	51.00 to 52.00
No. 2 bundles	41.50 to 42.50
No. 1 busheling	51.00 to 52.00
Machine shop turn.	32.00 to 33.00
Mixed bor. short turn.	35.00 to 36.00
Cast iron borings	35.00 to 36.00
Shoveling turnings	36.00 to 37.00
Clean cast. chem. borings	43.00 to 44.00
Low phos. 5 ft and under	56.00 to 57.00
Low phos. 2 ft and under	57.00 to 58.00
Low phos. punch'gs	57.00 to 58.00
Elec. furnace bundles	54.00 to 55.00
Heavy turnings	46.00 to 47.00
RR steel wheels	65.00 to 66.00
RR spring steel	65.00 to 66.00
Rails 18 in. and under	71.00 to 72.00
Cupola cast.	46.00 to 47.00
Heavy breakable cast.	52.00 to 53.00
Cast iron car wheels	57.00 to 58.00
Malleable	61.00 to 62.00
Unstripped motor blocks	41.00 to 42.00
No. 1 machinery cast.	56.00 to 57.00

Cleveland

No. 1 hvy. melting	$51.00 to $52.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 dealer bundles	51.00 to 52.00
No. 1 factory bundles	55.50 to 56.50
No. 2 bundles	42.00 to 43.00
No. 1 busheling	51.00 to 52.00
Machine shop turn.	23.00 to 24.00
Mixed bor. and turn.	28.00 to 29.00
Shoveling turnings	28.00 to 29.00
Cast iron borings	28.00 to 29.00
Cut struct'r'l & plates, 2 ft & under	57.00 to 58.00
Drop forge flashings	51.00 to 52.00
Low phos. punch'gs, plate	52.00 to 53.00
Foundry steel, 2 ft & under	54.00 to 55.00
No. 1 RR heavy melting	55.00 to 56.00
Rails 2 ft and under	72.00 to 73.00
Rails 18 in. and under	73.00 to 74.00
Railroad grate bars	33.00 to 34.00
Steel axle turnings	31.00 to 32.00
Railroad cast.	54.00 to 55.00
No. 1 machinery cast.	54.00 to 55.00
Stove plate	48.00 to 49.00
Malleable	60.00 to 61.00

Youngstown

No. 1 hvy. melting	$54.00 to $55.00
No. 2 hvy. melting	46.00 to 47.00
No. 1 dealer bundles	54.00 to 55.00
No. 2 bundles	43.00 to 44.00
Machine shop turn.	29.00 to 30.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	33.00 to 34.00
Low phos. plate	55.00 to 56.00

Buffalo

No. 1 hvy. melting	$48.00 to $49.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 busheling	48.00 to 49.00
No. 1 dealer bundles	48.00 to 49.00
No. 2 bundles	35.00 to 36.00
Machine shop turn.	28.00 to 29.00
Mixed bor. and turn.	30.00 to 31.00
Shoveling turnings	34.00 to 35.00
Cast iron borings	31.00 to 32.00
Low phos. plate	51.00 to 52.00
Scrap rails, random lgth.	59.00 to 60.00
Rails 2 ft and under	69.00 to 70.00
RR. steel wheels	56.00 to 57.00
RR. spring steel	52.00 to 53.00
RR. couplers and knucklers	52.00 to 53.00
No. 1 machinery cast.	52.00 to 53.00
No. 1 cupola cast.	47.00 to 48.00

Detroit

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$46.00 to $47.00
No. 2 hvy. melting	38.00 to 39.00
No. 1 dealer bundles	46.00 to 47.00
No. 2 bundles	35.00 to 36.00
No. 1 busheling	45.00 to 46.00
Drop forge flashings	43.00 to 44.00
Machine shop turn.	25.00 to 26.00
Mixed bor. and turn.	28.00 to 29.00
Shoveling turnings	28.00 to 29.00
Cast iron borings	28.00 to 29.00
Low phos. punch'gs plate	46.00 to 47.00
No. 1 cupola cast.	48.00 to 49.00
Heavy breakable cast.	44.00 to 45.00
Stove plate	45.00 to 46.00
Automotive cast.	54.00 to 55.00

St. Louis

No. 1 hvy. melting	$48.00 to $49.00
No. 2 hvy. melting	45.00 to 46.00
No. 1 dealer bundles	49.00 to 50.00
No. 2 bundles	40.00 to 41.00
Machine shop turn.	30.00 to 31.00
Cast iron borings	32.00 to 33.00
Shoveling turnings	32.00 to 33.00
No. 1 RR hvy. melting	54.00 to 55.00
Rails, random lengths	63.00 to 64.00
Rails 18 in. and under	71.00 to 72.00
Locomotive tires uncut	58.00 to 59.00
Angles and splice bars	60.00 to 61.00
Std. steel car axles	64.00 to 65.00
RR specialties	60.00 to 61.00
Cupola cast	48.00 to 49.00
Heavy breakable cast.	43.00 to 44.00
Cast iron brake shoes	43.00 to 44.00
Stove plate	44.00 to 45.00
Cast iron car wheels	51.00 to 52.00
Rerolling rails	70.00 to 71.00
Unstripped motor blocks	43.00 to 44.00

Boston

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$40.50 to $41.50
No. 2 hvy. melting	32.00 to 33.00
No. 1 dealer bundles	40.50 to 41.50
No. 2 bundles	32.00 to 33.00
No. 1 busheling	39.50 to 40.50
Elec. furnace, 3 ft & under	44.00 to 45.00
Machine shop turn.	21.00 to 22.00
Mixed bor. and short turn.	23.00 to 24.00
Shoveling turnings	23.00 to 24.00
Clean cast. chem. borings	30.50 to 31.50
No. 1 machinery cast.	40.00 to 41.00
Mixed cupola cast.	33.00 to 34.00
Heavy breakable cast.	40.00 to 41.00
Stove plate	32.00 to 33.00
Unstripped motor blocks	31.00 to 32.00

New York

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$48.00 to $49.00
No. 2 hvy. melting	41.00 to 42.00
No. 2 dealer bundles	37.00 to 38.00
Machine shop turn.	24.00 to 25.00
Mixed bor. and turn.	25.00 to 26.00
Shoveling turnings	28.00 to 29.00
Clean cast. chem. borings	34.00 to 35.00
No. 1 machinery cast.	46.00 to 47.00
Mixed yard cast.	41.00 to 42.00
Charging box cast.	45.00 to 46.00
Heavy breakable cast.	45.00 to 46.00
Unstripped motor blocks	39.00 to 40.00

Birmingham

No. 1 hvy. melting	$47.00 to $48.00
No. 2 hvy. melting	38.00 to 39.00
No. 1 dealer bundles	48.00 to 49.00
No. 2 bundles	32.00 to 33.00
No. 1 busheling	47.00 to 48.00
Machine shop turn.	38.00 to 39.00
Shoveling turnings	39.00 to 40.00
Cast iron borings	27.00 to 28.00
Electric furnace bundles	48.00 to 49.00
Elec. furnace, 3 ft & under	46.00 to 47.00
Bar crops and plate	56.00 to 57.00
Structural and plate, 2 ft	55.00 to 56.00
No. 1 RR hvy. melting	52.00 to 53.00
Scrap rails, random lgth.	60.00 to 61.00
Rails, 18 in. and under	68.00 to 69.00
Angles & splice bars	60.00 to 61.00
Rerolling rails	70.00 to 71.00
No. 1 cupola cast.	54.00 to 55.00
Stove plate	54.00 to 55.00
Charging box cast.	37.00 to 38.00
Cast iron car wheels	46.00 to 47.00
Unstripped motor blocks	44.00 to 45.00

Cincinnati

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$50.00 to $51.00
No. 2 hvy. melting	44.00 to 45.00
No. 1 dealer bundles	50.00 to 51.00
No. 2 bundles	40.00 to 41.00
Machine shop turn.	31.00 to 32.00
Mixed bor. and turn.	28.00 to 29.00
Shoveling turnings	34.00 to 35.00
Cast iron borings	28.00 to 29.00
Low phos. 18 in. and under	57.00 to 58.00
Rails, random lengths	63.00 to 64.00
Rails, 18 in. and under	71.00 to 72.00
No. 1 cupola cast.	45.00 to 46.00
Hvy. breakable cast.	43.00 to 44.00
Drop broken cast.	55.00 to 56.00

San Francisco

No. 1 hvy. melting	$44.00
No. 2 hvy. melting	42.00
No. 1 dealer bundles	43.00
No. 2 bundles	35.00
Machine shop turn.	$29.00 to 30.00
Cast iron borings	30.00 to 32.00
No. 1 RR hvy. melting	44.00
No. 1 cupola cast.	53.00

Los Angeles

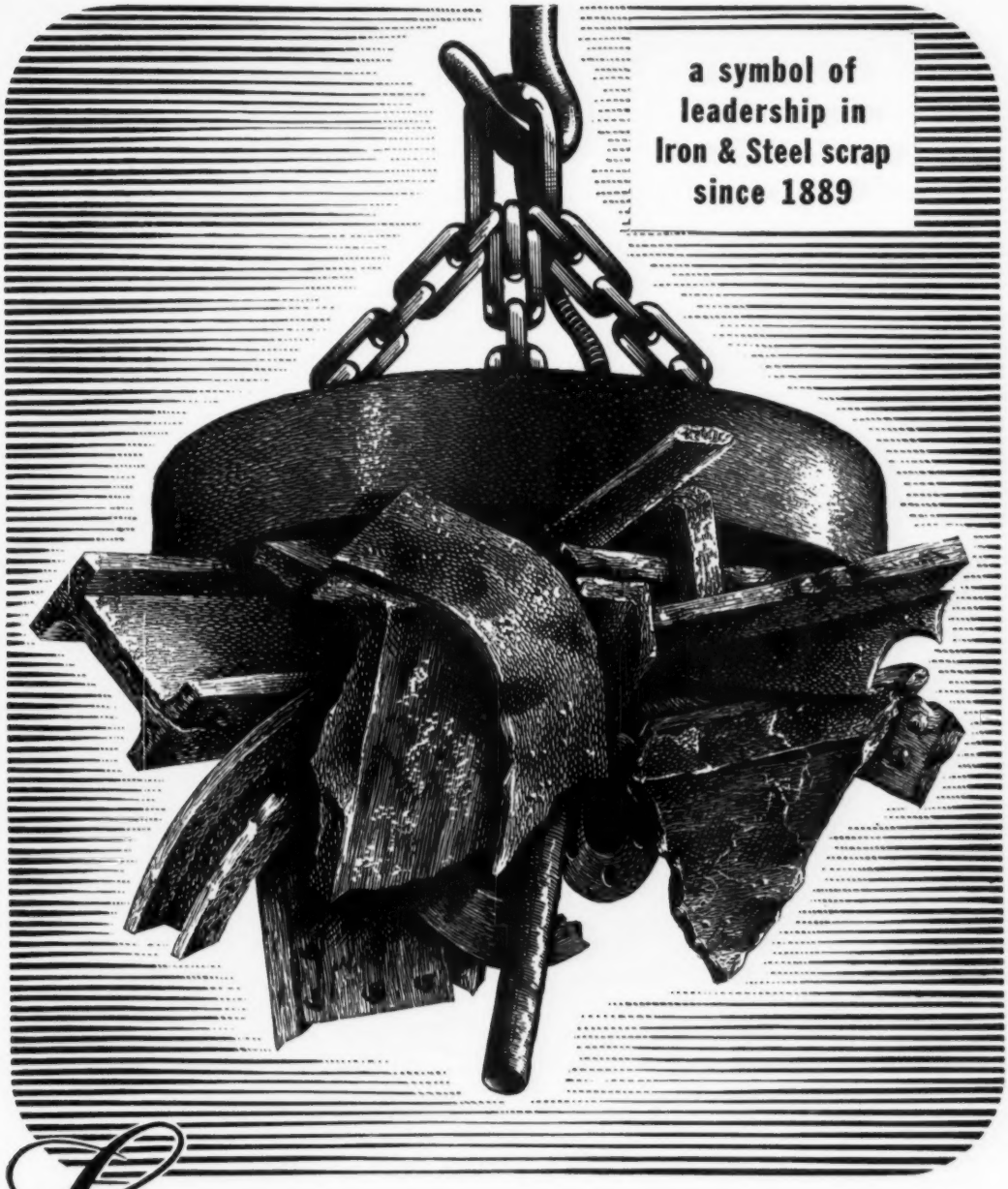
No. 1 hvy. melting	$44.00
No. 2 hvy. melting	42.00
No. 1 dealer bundles	43.00
No. 2 bundles	35.00
Machine shop turn.	$29.00 to 30.00
Shoveling turnings	32.00
Cast iron borings	32.00
Elec. furn. 1 ft and under (foundry)	55.00
No. 1 RR hvy. melting	44.00
No. 1 cupola cast.	49.00

Seattle

No. 1 hvy. melting	$44.00
No. 2 hvy. melting	42.00
No. 2 bundles	33.00
No. 1 cupola cast.	46.00
Mixed yard cast.	46.00

Hamilton, Ont.

No. 1 hvy. melting	$50.00
No. 2 hvy. melting	45.00
No. 1 dealer bundles	50.00
No. 2 bundles	39.00
Mixed steel scrap	42.00
Busheling	36.00
Bush., new fact., prep'd.	50.00
Bush., new fact., unprep'd	44.00
Machine shop turn.	22.00
Short steel turn.	30.00
Mixed bor. and turn.	24.00
Rails, rerolling	56.00
Cast scrap	52.00



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Expect Tin to Stay A Buyers Market

Flurry of activity last week was mainly transactions of the professionals.

Market is near the floor, but no major tightening is expected in fourth quarter.

▪ Discount the flurry of activity in the New York tin market last week. Market professionals say it was caused by: (1) The uncertainty of the future value of some European currency; and (2) Transactions between traders to improve positions.

In the former case speculators converted cash into commodities, in many cases tin. This metal will eventually come back on the market.

In the latter case, no tin actually leaves the market, but is available from different sellers.

Good News—This is good news for the average small or medium size tin consumer or fabricator. Major tin brokers and sellers say they are not now in the market because business is lagging a little. Price is near its floor, but they can't buy until they know what fourth quarter business will be.

Here's what most traders and professionals say is in store in the last quarter for the tin market:

"There is just too much tin being produced for any shortage to develop," says one trader. He points out that the Tin Council of the International Tin Agreement has revised its estimate of the 1957 tin surplus from 5000-7000 tons, up to 10,000 tons.

Big Boys Buying — Another points out that major U. S. consumers (steel companies) have been buying "modestly but consistently" through the current price decline. Their stocks are estimated at between 2½ and 3½ months. This observer just doesn't think other consumers have enough buying potential to upset the market.

A trader down the street pretty much agrees. He admits that many of his customers are underbought. But he believes that even if everyone started buying at the same time there would only be a "momentary flurry," and the market would settle down quickly not much above current levels.

Russia Selling Tin—A number of things support the position of the tin market professionals. Foremost is the report from Europe that the Russians are selling tin in Western markets. Estimates are that between 500 to 1000 tons per month, much of it top quality, are coming from behind the Iron Curtain, and selling for less than the London or New York price.

It had not been known previously that Russia had a mine or smelter. Traders guess that the Russians probably developed a tin producing industry and are using the Free World as a dumping ground for surplus production.

Thus far, none has been offered for sale in the U. S. There are no official restrictions, but most traders say they won't handle it. It has been replacing tin which would have been sold in Europe, some of which is flooding the London market, or coming to New York.

More From Malaya—August 31 was Merdeka day in Malaya. The world's largest tin producer became independent. Considering tin and rubber are the mainstays of the new country's economy, increased emphasis can be expected in tin mining and production.

Although there has been no official announcement, most authorities are sure the buffer stock of the International Tin Agreement has been buying metal. When the stock contains 10,000 tons, the council has the right to restrict output in member countries. Observers say acquisitions by the buffer stock can't be anywhere near the 10,000 tons.

Aluminum

Reports from major producers indicate orders placed for fourth quarter delivery have been disappointing. There has been a slight pickup in automotive buying. But at the current rate, shipments will be no better in the last quarter than in the

Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in August based on quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper, del'd Conn. Valley	28.713
Copper, Lake	28.647
Straits Tin, New York	94.261
Zinc, E. St. Louis	10.00
Lead, St. Louis	13.80
Aluminum ingot,	27.10

Note: Quotations are going prices.

Primary Prices

(cents per lb)	Current price	last price	date of change
Aluminum ingot	28.10	27.10	8/1/57
Aluminum pig	26.00	25.00	8/1/57
Copper (E)	28.50	29.25	8/6/57
Copper (CS)	27.00	27.25	8/28/57
Copper (L)	28.50	29.25	8/6/57
Lead, St. L.	13.80	14.60	8/11/57
Lead, N. Y.	14.00	15.00	8/11/57
Magnesium ingot	36.00	34.00	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	74.00	64.50	12/6/56
Titanium sponge	200-250	250-275	8/6/57
Zinc, E. St. L.	10.00	10.50	7/1/57
Zinc, N. Y.	10.50	11.00	7/1/57

ALUMINUM: 99% ingot frt allwd. COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig. Velasco, Tex. NICKEL: Port Colbourne, Canada. ZINC: prime western. TIN: see right; other primary prices, pg. 170.

third. The producers say they have not felt the aircraft cutbacks and stretchouts yet, but expect to very soon.

Aluminum Co. of Canada continues to lose about 1000 tons each day and is not much closer to settlement of the strike which began May 17 at their Arvida plant, world's biggest aluminum smelter. Most of the minor, side issues have been cleared up. But the gap between management and labor looks even bigger on the extent of the contract coverage.

The union is holding out for a single, master contract to cover all of Alcan's plants. Management says this is impractical because the situation differs radically in some cases. And neither seems ready to compromise.

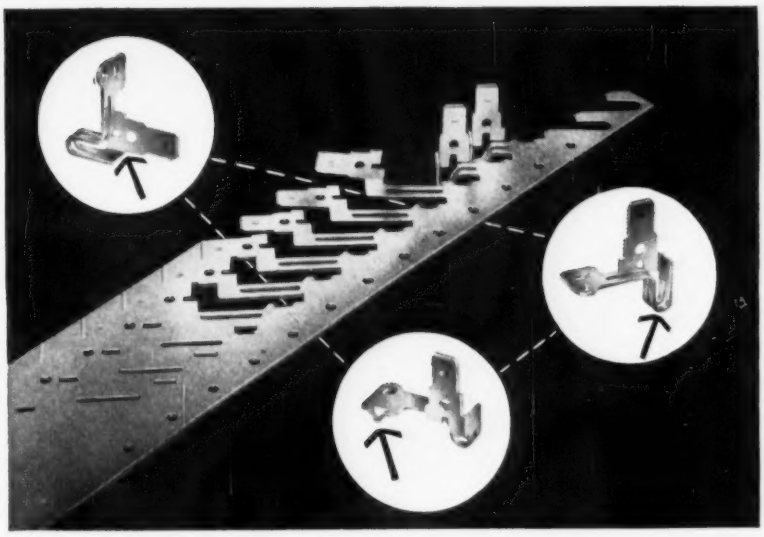
Copper

Custom smelters dropped the price of their copper by ¼¢ to 27¢ per pound late last week. But the lower price had little if any effect on the market. Smelters are more convinced than ever that they just aren't going to boost business until the general economic atmosphere clears.

A combination of the long Labor Day weekend, the end of the month, and some holding of scrap in yards by a few dealers prevented the custom smelters' buying prices for copper scrap from following the metal down. But the tone of the market continues to be very soft. A major smelter is not in the No. 1 market, and another is carefully screening lots, taking only the best scrap.

There have been suggestions that the lower custom smelter price and the continued weakness of the market will force producers to reduce their prices. Some more seasoned observers say this is not likely for at least a week or so. They say producers will wait to see what the first few weeks in September bring.

Tin prices for the week: Aug. 28, 93.25; Aug. 29, 93.125; Aug. 30, 93.00; Sept. 3, 93.00*.
* Estimate.



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NONFERROUS PRICES *(Effective Sept. 3, 1957)*

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate

("F" temper except 6061-0)

Alloy	.032	.081	.136-.249	.250-3.
1100, 3003	46.6	44.3	43.6	42.7
5052	54.0	48.9	47.2	45.4
6061-0	51.4	47.0	45.2	45.1

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6- 8	45.0-46.8	60.4-64.1
12-14	45.7-47.2	61.3-65.8
24-26	49.0-49.5	72.1-76.8
36-38	58.0-58.6	96.2-99.8

Screw Machine Stock—2011-T-3

Size*	½	⅝-⅞	⅝-1	1⅛-1½
Price	63.0	62.5	61.0	58.6

Roofing Sheet, Corrugated

(Per sheet, 36" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.420	$1.893	$2.367	$2.839
.024 gage	1.774	2.366	2.957	3.549

MAGNESIUM

(F.o.b. shipping Pt., carload frt. allowed)

Sheet and Plate

Type ↓ Gage→	.250-3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	108.1
AZ31B Spec.	.....	93.3	95.7	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	69.6	70.7	75.6	89.2
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	126	106	128
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	120	105	121
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included on 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	50.63	.....	47.86	50.82
Brass, 70/30	44.02	44.56	45.34	46.93
Brass, Low	46.70	47.24	46.64	49.51
Brass, R L	47.64	48.18	47.58	50.45
Brass, Naval	48.19	.....	42.50	51.60
Munts Metal	46.29	.....	42.10	.....
Comm. Bs.	49.13	49.67	49.07	51.69
Mang. Bs.	51.93	.....	46.03	.....
Phos. Bs. 5%	69.61	.....	70.11	.....

Free Cutting Brass Rod 32.23

TITANIUM

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, $9.50-$10.60; alloy, $14.75; Plate, HR, commercially pure, $8.00-$8.75; alloy, $10.75. Wire, rolled and/or drawn, commercially pure, $7.50-$8.00; alloy, $10.00; Bar, HR or forged, commercially pure, $6.15-$6.40; alloy, $6.15-$6.35; billets, HR, commercially pure, $6.00-$6.25; alloy, $6.00-$6.20.

PRIMARY METAL

(Cents per lb, unless otherwise noted)

Antimony, American, Laredo, Tex... 33.50
Beryllium aluminum 5% Be, Dollar per lb contained Be $74.75
Beryllium copper, per lb conta'd Be.$43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $71.50
Bismuth, ton lots .....$ 2.25
Cadmium, del'd .....$ 1.70
Calcium, 99.9%, small lots .....$ 4.55
Chromium, 99.8% metallic basis....$ 1.31
Cobalt, 97-99% (per lb)....$2.00 to $2.07
Germanium, per gm, f.o.b. Miami, Okla., refined 39.50-53.50
Gold, U. S. Treas., per troy oz.....$35.00
Indium, 99.9%, dollars per troy oz...$ 2.25
Iridium, dollars per troy oz....$86 to $89
Lithium, 98% .....$11.00 to $14.00
Magnesium, sticks, 100 to 500 lb.... 59.00
Mercury, dollars per 76-lb flask, f.o.b. New York .....$250 to $252
Nickel oxide sinter at Copper Cliff, Ont., contained nickel 71.25
Palladium, dollars per troy oz...$23 to $24
Platinum, dollars per troy oz. ...$82 to $87
Rhodium .....$120.00 to $125.00
Silver ingots (¢ per troy oz.) 90.625
Thorium, per kg. $43.00
Uranium, normal per kg. $40.00
Vanadium .....$ 3.45
Zirconium sponge $10.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
No. 115 ..... 28.75
No. 120 ..... 27.75
No. 123 ..... 26.25
80-10-10 ingot
No. 305 ..... 32.75
No. 315 ..... 30.75
88-10-2 ingot
No. 210 ..... 40.25
No. 215 ..... 36.50
No. 245 ..... 32.75
Yellow ingot
No. 405 ..... 23.50
Manganese bronze
No. 421 ..... 26.50

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
0.30 copper max. 25.75-26.50
0.60 copper max. 25.50-26.00
Piston alloys (No. 122 type)..23.25-25.00
No. 12 alum. (No. 2 grade)....22.25-23.00
108 alloy 22.75-23.50
195 alloy 25.25-26.75
13 alloy (0.60 copper max.)....25.50-26.00
AXS-679 .....22.75-23.50

Steel deoxidizing aluminum, notch bar granulated or shot

Grade 1—95-97½% 24.00-25.00
Grade 2—92-95% 22.25-23.00
Grade 3—90-92% 21.25-22.00
Grade 4—85-90% 19.75-21.00

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	24½	23¾
Yellow brass	18⅜	16⅝
Red brass	21½	20¾
Comm. bronze	22⅜	21⅝
Mang. bronze	17	16¼
Yellow brass rod ends	18⅛	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire ..... 22 —22¼
No. 2 copper wire ..... 20½—20¾
Light copper ..... 18¼—18½
*Refinery brass 20
Copper bearing material 19
*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire ..... 22 —22¼
No. 2 copper wire ..... 20½—20¾
Light copper ..... 18¼—18½
No. 1 composition 21
No. 1 comp. turnings 20½
Hvy. yellow brass solids 15¼
Brass pipe 18½
Radiators 16
Aluminum
Mixed old cast. ..... 14 —14½
Mixed new clips ..... 16½—17
Mixed turnings, dry ..... 14½—15½

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 19½—20
No. 2 copper wire ..... 18 —18½
Light copper ..... 16 —16½
Auto radiators (unsweated).. 13 —13½
No. 1 composition ..... 17¾—18¼
No. 1 composition turnings... 17¼—17¾
Cocks and faucets ..... 14 —14½
Clean heavy yellow brass ... 12 —12½
Brass pipe ..... 15 —15½
New soft brass clippings .... 15¾—16¼
No. 1 brass rod turnings .... 13¼—13¾

Aluminum

Alum. pistons and struts .... 5½— 6
Aluminum crankcases ..... 11 —11½
1100 (2S) aluminum clippings 14 —14½
Old sheet and utensils ..... 11 —11½
Borings and turnings ..... 7 — 7½
Industrial castings ..... 11 —11½
2024 (24S) Clippings ..... 12½—13

Zinc

New zinc clippings ..... 4 — 4½
Old zinc ..... 3 — 3¼
Zinc routings ..... 1¾— 2
Old die cast scrap ..... 1½— 1¾

Nickel and Monel

Pure nickel clippings 75-80
Clean nickel turnings 60-65
Nickel anodes 75-80
Nickel rod ends 75-80
New Monel clippings 45-48
Clean Monel turnings 35-40
Old sheet Monel 44-45
Nickel silver clippings, mixed. 21
Nickel silver turnings, mixed. 18

Lead

Soft scrap lead ..... 9½—10
Battery plates (dry) ..... 4¼— 4½
Batteries, acid free ..... 2¾— 3

Miscellaneous

Block tin ..... 75 —76
No. 1 pewter ..... 59 —60
Auto babbitt ..... 39 —40
Mixed common babbitt ..... 11 —11½
Solder joints ..... 15½—16
Siphon tops 42
Small foundry type ..... 13 —13¼
Monotype ..... 13 —13¼
Lino. and stereotype ..... 12 —12¼
Electrotype ..... 11 —11¼
Hand picked type shells ..... 8 — 8½
Lino. and stereo. dross ..... 3¾— 4
Electro. dross ..... 3 — 3¼

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IRON AGE

STEEL PRICES

(Effective Sept. 3, 1957)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide Flange	Hot rolled	Cold rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot rolled	Alloy Cold rolled
EAST	Bethlehem, Pa.			$114.00 *B3*		5.325 *B3*	7.80 *B3*	5.325 *B3*						
	Buffalo, N. Y.	$77.50 *R3, B3*	$96.00 *R3, B3*	$114.00 *R3, B3*	6.225 *B3*	5.325 *B3*	7.80 *B3*	5.325 *B3*	4.925 *R3, B3*	7.15 *S10*	7.325 *B3*			
	Phila., Pa.									7.70 *P15*				
	Harrison, N. J.													15.05 *C11*
	Conshohocken, Pa		$101.00 *A2*	$121.00 *A2*					4.975 *A2*	7.20 *A2*	7.325 *A2*			
	New Bedford, Mass.									7.60 *R6*				
	Johnstown, Pa.	$77.50 *B3*	$96.00 *B3*	$114.00 *B3*		5.325 *B3*	7.80 *B3*							
	Boston, Mass.									7.70 *T8*				15.40 *T8*
	New Haven, Conn.									7.60 *D1*				
	Baltimore, Md.									7.15 *T8*				15.05 *T8*
	Phoenixville, Pa.					5.50 *P2*		5.50 *P2*						
	Sparrows Pt., Md.								4.925 *B3*		7.325 *B3*			
	Bridgeport, Wallingford, Conn.	$80.50 *N8*	$101.00 *N8*	$114.00 *N8*						7.60 *W1*				
	Pawtucket, R. I. Worcester, Mass.									7.70 *N7* 7.70 *A5*				15.40 *N7* 15.20 *T8*
MIDDLE WEST	Alton, Ill.								5.125 *L1*					
	Ashland, Ky.								4.925 *A7*					
	Canton-Massillon, Dover, Ohio		$96.00 *R3*	$114.00 *R3, T5*						7.15 *G4*		10.40 *G4*		14.85 *C11*
	Chicago, Ill. Franklin Park, Ill. Evanston, Ill.	$77.50 *U1, R3*	$96.00 *U1, R3,W8*	$114.00 *U1, R3,W8*	6.225 *U1*	5.275 *U1, W8,P13*	7.75 *U1,Y1* 6.525 *W8*	5.275 *U1*	4.925 *W8, N4,A1*	7.25 *A1,T8 M8*			8.10 *W8, S9,I3*	15.05 *A1, S9,G4*
	Cleveland, Ohio									7.15 *A5,J3*		10.50 *A5*	8.10 *J3*	
	Detroit, Mich.			$114.00 *R5*					5.025 *G3, M2*	7.25 *M2,D1, D2,G3,P11*	7.425 *G3*	10.60 *G3, D2*	8.10 *G3*	
	Anderson, Ind.									7.15 *G4*		10.40 *G4*		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	$77.50 *U1*	$96.00 *U1*	$114.00 *U1, Y1*		5.275 *U1, I3*	7.75 *U1, I3*	5.525 *I3*	4.925 *U1, I3,Y1*	7.15 *Y1*	7.325 *U1, I3,Y1*	10.50 *Y1*	8.10 *U1, Y1*	
	Sterling, Ill.	$77.50 *N4*				5.275 *N4*			5.025 *N4*					
	Indianapolis, Ind.									7.30 *J3*				51.20 *J3*
	Newport, Ky.												8.10 *A9*	
	Middletown, Ohio													
	Niles, Warren, Ohio Sharon, Pa.		$96.00 *S1, C10*	$114.00 *C10,S1*					4.925 *R3, S1*	7.15 *R3,T4 S1*	7.325 *R3, S1*	10.50 *S1* 10.45 *R3*	8.10 *S1*	15.05 *S1*
	Pittsburgh, Pa. Midland, Pa. Butler, Pa. Aliquippa, Pa.	$77.50 *U1, P6*	$96.00 *U1, C11,P6*	$114.00 *U1, C11*	6.225 *U1*	5.275 *U1, J3*	7.75 *U1, J3*	5.275 *U1*	4.925 *P6*	7.15 *J3,B4, S7*			8.10 *S9*	15.05 *S9*
	Weirton, Wheeling Follansbee, W. Va.					5.275 *W3*			4.925 *W3*	7.15 *W3,F3*	7.325 *W3*	10.50 *W3*		
	Youngstown, Ohio	$77.50 *R3*	$96.00 *Y1, C10*	$114.00 *Y1*		5.425 *Y1*	7.75 *Y1*			7.15 *Y1, J3*	7.325 *U1, Y1*	10.65 *Y1*	8.10 *U1, Y1*	15.05 *J3*
WEST	Fontana, Cal.	$88.00 *K1*	$105.50 *K1*	$135.00 *K1*		6.075 *K1*	8.55 *K1*	6.225 *K1*	5.825 *K1*	9.00 *K1*				
	Geneva, Utah		$96.00 *C7*			5.275 *C7*	7.75 *C7*							
	Kansas City, Mo.					5.375 *S2*	7.85 *S2*						8.35 *S2*	
	Los Angeles, Torrance, Cal.		$105.50 *B2*	$134.00 *B2*		5.975 *C7, B2*	8.45 *B2*		5.675 *C7, B2*				9.30 *B2*	
	Minnequa, Colo.					5.575 *C6*			6.025 *C6*	9.10 *K1*				
	Portland, Ore.					6.025 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$105.50 *B2*			5.925 *B2*	8.40 *B2*		5.675 *C7, B2*					
	Seattle, Wash.		$109.50 *B2*			6.025 *B2*	8.50 *B2*		5.925 *B2*					
SOUTH	Atlanta, Ga.					5.475 *A8*			5.125 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$77.50 *T2*	$96.00 *T2*			5.275 *T2, R3,C16*	7.75 *T2*		4.925 *T2, R3,C16* 5.225 *C10*		7.325 *T2*			
	Houston, Lone Star, Texas		$101.00 *S2*	$119.00 *S2*		5.375 *S2*	7.85 *S2*						8.35 *S2*	

IRON AGE

STEEL PRICES

(Effective Sept. 3, 1957)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE
		Hot rolled *18* ga. & hvyr.	Cold rolled	Galvanized	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled *19* ga.		Cokes* *1.25*-lb. base box	Electro* *0.25*-lb. base box	Holloware Enameling *29* ga.
EAST	Bethlehem, Pa.											† Special coated mfg terne deduct 50¢ from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb. 0.25 lb. add 65¢.		
	Buffalo, N. Y.	4.925 *B3*	6.05 *B3*				7.275 *B3*	8.975 *B3*			6.15 *W6*			
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.	4.975 *A2*	6.10 *A2*				7.325 *A2*							
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.										6.15 *B3*			
	Fairless, Pa.	4.975 *U1*	6.10 *U1*				7.325 *U1*	9.025 *U1*				$10.15 *U1*	$8.85 *U1*	
	New Haven, Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	4.925 *B3*	6.05 *B3*	6.60 *B3*			7.275 *B3*	8.975 *B3*	9.725 *B3*		6.25 *B3*	$10.15 *B3*	$5.85 *B3*	
	Worcester, Mass.										6.45 *A5*			
	Trenton, N. J.													
MIDDLE WEST	Alton, Ill.										6.35 *L1*			
	Ashland, Ky.	4.925 *A7*		6.60 *A7*	6.625 *A7*									
	Canton-Massillon, Dover, Ohio			6.60 *R3, R1*										
	Chicago, Joliet, Ill.	4.925 *W8, A1*					7.275 *U1*				6.15 *A5, R3 W8, N4, K2*			
	Sterling, Ill.										6.25 *N4, K2*			
	Cleveland, Ohio	4.925 *R3, J3*	6.05 *R3, J3*		6.625 *R3*		7.275 *R3, J3*	8.975 *R3, J3*			6.15 *A5*			
	Detroit, Mich.	5.025 *G3, M2*	6.15 *G3* 6.05 *M2*				7.375 *G2*	9.075 *G3*						
	Newport, Ky.	4.925 *A1*	6.05 *A1*											
	Gary, Ind. Harbor, Indiana	4.925 *U1, I3, Y1*	6.05 *U1, I3, Y1*	6.60 *U1, I3*	6.625 *U1, I3, Y1*	7.00 *U1*	7.275 *U1, Y1, I3*	8.975 *U1, Y1*			6.15 *Y1*	$10.05 *U1, Y1*	$8.75 *I3, U1, Y1*	7.50 *U1, Y1*
	Granite City, Ill.	5.125 *G2*	6.25 *G2*	6.80 *G2*	6.825 *G2*								$8.85 *G2*	7.60 *G2*
	Kokomo, Ind.			6.70 *C9*							6.25 *C9*			
	Mansfield, Ohio		6.05 *E2*			7.00 *E2*								
	Middletown, Ohio		6.05 *A7*	6.60 *A7*	6.625 *A7*	7.00 *A7*								
	Niles, Warren, Ohio Sharon, Pa.	4.925 *R3, N3, S1*	6.05 *R3*	6.60 *R3*	6.625 *N3, S1*	7.00 *N3, S1, R3*	7.275 *R3*	8.975 *S1, R3*					8.75 *R3*	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa. Donora, Pa. Aliquippa, Pa.	4.925 *U1, J3, P6*	6.05 *U1, J3, P6*	6.60 *U1, J3*	6.625 *U1*		7.275 *U1, J3*	8.975 *U1, J3*	9.725 *U1*		6.15 *A5, J3, P6*	$10.05 *U1, J3*	$8.75 *U1, J3*	7.50 *U1, J3*
	Portsmouth, Ohio	4.925 *P7*	6.05 *P7*								6.15 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	4.925 *W3, W5*	6.05 *W3, F3, W5*	6.60 *W3, W5*		7.00 *W3, W5*	7.275 *W3*	8.975 *W3*				$10.05 *W5, W3*	$8.75 *W5, W3*	7.50 *W5*
	Youngstown, Ohio	4.925 *U1, Y1*	6.05 *Y1*		6.625 *Y1*		7.275 *Y1*	8.975 *Y1*			6.15 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.30 *K1*				8.175 *K1*	10.275 *K1*				$10.80 *K1*	$9.50 *K1*	
	Geneva, Utah	5.025 *C7*												
	Kansas City, Mo.										6.40 *S2*			
	Los Angeles, Torrance, Cal.										6.95 *B2*			
	Minnequa, Colo.										6.40 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.625 *C7*	7.00 *C7*	7.35 *C7*							6.95 *C7*	$10.80 *C7*	$9.50 *C7*	
	Seattle, Wash.													
SOUTH	Atlanta, Ga.													
	Fairfield, Ala. Alabama City, Ala.	4.925 *T2, R3*	6.05 *T2, R3*	6.60 *T2, R3*							6.15 *T2, R3*	$10.15 *T2*	$8.85 *T2*	
	Houston, Tex.										6.40 *S2*			

STEEL PRICES

(Effective Sept. 3, 1957)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.475 *B3*	8.775 *B3*	7.925 *B3*					
	Buffalo, N. Y.	5.425 *R3,B3*	5.425 *R3,B3*	7.35 *B3*	6.475 *B3,R3*	8.775 *B3,B5*	7.925 *B3*	5.10 *B3*		7.20 *B2*	7.625 *B2*	7.65 *W6*
	Claymont, Del.							5.70 *P2*		7.20 *C4*	7.625 *C4*	
	Coatesville, Pa.							5.50 *L4*		7.20 *L4*	7.925 *L4*	
	Conshohocken, Pa.							5.20 *A2*	6.175 *A2*	7.20 *A2*	7.625 *A2*	
	Harrisburg, Pa.							5.80 *P2*	6.275 *P2*			
	Milton, Pa.	5.575 *M7*	5.575 *M7*									
	Hartford, Conn.			7.80 *R3*		9.075 *R3*	7.925 *B3*					
	Johnstown, Pa.	5.425 *B3*	5.425 *B3*		6.475 *B3*			5.10 *B3*		7.20 *B3*	7.625 *B3*	7.65 *B3*
	Fairless, Pa.	5.575 *U1*	5.575 *U1*		6.625 *U1*							
	Newark, N. J. Camden, N. J.			7.75 *W10* 7.75 *P10*		8.95 *W10* 8.95 *P10*						
	Bridgeport, Conn. Putnam, Conn. Willimantic, Conn.	5.650 *N8*	5.650 *N8*	7.65 *N8* 7.85 *W10* 7.80 *J3*	6.550 *N8*	8.925 *N8*						
	Sparrows Pt., Md.		5.425 *B3*					5.10 *B3*		7.20 *B3*	7.625 *B3*	7.75 *B3*
	Palmer, Worcester, Readville, Mass. Mansfield, Mass.			7.85 *B5,C14*		9.075 *A5,B5*						7.95 *A5, W6*
	Spring City, Pa.			7.75 *K4*		8.950 *K4*						
MIDDLE WEST	Alton, Ill.	5.625 *L1*										7.85 *L1*
	Ashland, Newport, Ky.							5.10 *A7,A1*		7.20 *A1*		
	Canton, Massillon, Ohio			7.30 *R3,R2*	6.475 *R3,T5*	8.775 *R3,R2, T5*						
	Chicago, Joliet, Waukegan, Ill. Harvey, Ill.	5.425 *U1,R3, W8,N4,P13*	5.425 *U1,R3, N4,P13*	7.30 *A5, W10,W8, B5,L2,N9*	6.475 *U1,R3, W8*	8.775 *A5, W10,W8, L2,N9,B5*	7.925 *U1* 6.675 *W8*	5.10 *U1,A1, W8,I3*	6.175 *U1*	7.20 *U1,W8*	7.625 *U1* 7.40 *W8*	7.65 *A5,R3, W8,N4, K2,W7*
	Cleveland, Ohio	5.425 *R3*	5.425 *R3*	7.30 *A5,C13*		8.775 *A5, C13*	7.925 *R3*	5.20 *R3,J3*	6.175 *J3*		7.625 *R3, J3*	7.65 *A5, C13*
	Detroit, Mich.	5.525 *G3*	5.775 *G3*	7.55 *P3* 7.50 *P8,B5*	6.475 *R5* 6.575 *G3*	8.775 *R5* 8.975 *B5,P3, P8*	8.025 *G3*	5.20 *G3*		7.35 *G3*		
	Duluth, Minn.											7.65 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.425 *U1,I3, Y1*	5.425 *U1,I3, Y1*	7.30 *R3,M5, J3*	6.475 *U1,I3, Y1*	8.775 *R3,M4*	7.925 *U1, Y1*	5.10 *U1,I3, Y1*	6.175 *J3,I3*	7.20 *U1,Y1*	7.625 *U1, Y1,I3*	7.75 *M4*
	Granite City, Ill.							5.30 *G2*				
	Kokomo, Ind.											7.75 *C9*
	Sterling, Ill.	5.525 *N4*	5.525 *N4*					5.10 *N4*				7.75 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.30 *C10*	6.475 *C10,S1*	8.775 *C10*	7.925 *S1*	5.10 *R3,S1*		7.20 *S1*	7.625 *R3, S1*	
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.425 *U1,J3*	5.425 *U1,J3*	7.30 *A5,B4, R3,J3,C11, W10,S9,C8*	6.475 *U1,J3, C11*	8.775 *A5, W10,R3,S9, C11,C8*	7.925 *U1,J3*	5.10 *U1,J3*	6.175 *U1*	7.20 *U1,J3*	7.625 *U1,I3*	7.65 *A5, J3,P6*
	Portsmouth, Ohio											7.65 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.10 *W5*				
	Youngstown, Ohio	5.425 *U1,R3, Y1*	5.425 *U1,R3, Y1*	7.30 *A5,Y1, F2*	6.475 *U1,Y1*	8.775 *Y1,F2*	7.925 *U1,Y1*	5.10 *U1,R3, Y1*		7.20 *Y1*	7.625 *U1, R3,Y1*	7.65 *Y1*
WEST	Emeryville, Cal. Fontana, Cal.	6.175 *J3* 6.125 *K1*	6.175 *J3* 6.125 *K1*		7.525 *K1*		8.625 *K1*	5.90 *K1*		8.00 *K1*	8.425 *K1*	
	Geneva, Utah							5.10 *C7*			7.625 *C7*	
	Kansas City, Mo.	5.675 *S2*	5.675 *S2*		6.725 *S2*		8.175 *S2*					7.90 *S2*
	Los Angeles, Torrance, Cal.	6.125 *C7,B2*	6.125 *C7,B2*	8.75 *R3,P14*	7.525 *B2*	10.65 *P14*	8.625 *B2*					8.60 *B2*
	Minnequa, Colo.	5.875 *C6*	5.875 *C6*					5.95 *C6*				7.90 *C6*
	Portland, Ore.	6.175 *O2*	6.175 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.125 *C7* 6.175 *B2*	6.125 *C7* 6.175 *B2*				8.675 *B2*					8.60 *C7,C6*
	Seattle, Wash.	6.175 *B2,N6*	6.175 *B2*				8.675 *B2*	6.00 *B2*		8.10 *B2*	8.525 *B2*	
SOUTH	Atlanta, Ga.	5.625 *A8*	5.625 *A8*									7.85 *A8*
	Fairfield, Ala. City, Birmingham, Ala.	5.425 *T2,R3, C16*	5.425 *T2,R3, C16, S11*	7.90 *C16*			7.925 *T2*	5.10 *T2,R3*			7.625 *T2*	7.65 *T2,R3*
	Houston, Ft. Worth, Lone Star, Tex.	5.675 *S2*	5.675 *S2*		6.725 *S2*		8.175 *S2*	5.20 *S2* 5.45 *L3*		7.30 *S2*	7.725 *S2*	7.90 *S2*

† Merchant Quality—Special Quality 35¢ higher.

STEEL PRICES *(Effective Sept. 3, 1957)*

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co. Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C17 Chester Blast Furnace, Inc., Chester, Pa

D1 Detroit Steel Corp., Detroit
D2 Dearborn Div., Sharon Steel Corp.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co. Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Div., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Northeastern Steel Corp., Bridgeport, Conn
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 J. & L. Steel Co., Stainless Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co. Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING — **Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.**

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In		2½ In.		3 In.		3½-4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	3.25	+12.0	6.25	+8.0	9.75	+3.50	12.25	+2.75	12.75	+1.75	13.25	+1.25	14.75	+1.50								
Youngstown *R3*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Fontana *K1*	+8.25	+23.5	+5.25	+19.5	+1.75	+15.00	0.75	+14.25	1.25	+13.25	1.75	+12.75	3.25	+13.00								
Pittsburgh *J3*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
Alton, Ill. *L1*	3.25	+12.0	6.25	+8.0	9.75	+3.50	12.25	+2.75	12.75	+1.75	13.25	+1.25	14.75	+1.50								
Sharon *M5*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Fairless *N2*	3.25	+12.0	6.25	+8.0	9.75	+3.50	12.25	+2.75	12.75	+1.75	13.25	+1.25	14.75	+1.50								
Pittsburgh *N1*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
Wheeling *W5*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Wheatland *W4*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Youngstown *Y1*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
Indiana Harbor *Y1*	4.25	+11.0	7.25	+7.0	10.75	+2.50	13.25	+1.75	13.25	+0.75	14.25	+0.25	15.75	+0.50								
Lorain *N2*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	7.75	+6.0	11.75	+2.0	14.75	2.50	15.25	1.25	15.75	2.25	16.25	2.75	16.75	1.50								
Youngstown *R3*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Fairless *N2*	7.75	+6.0	11.75	+2.0	14.75	2.50	15.25	1.25	15.75	2.25	16.25	2.75	16.75	1.50								
Fontana *K1*	+3.75		0.25		3.25		3.75		4.25		4.75		5.25									
Pittsburgh *J3*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50
Alton, Ill *L1*	7.75	+6.0	11.75	+2.0	14.75	2.50	15.25	1.25	15.75	2.25	16.25	2.75	16.75	1.50								
Sharon *M5*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Pittsburgh *N1*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50
Wheeling *W5*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Wheatland *W4*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Youngstown *Y1*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50
Indiana Harbor *Y1*	8.75	+5.0	12.75	+1.0	15.75	3.50	16.25	2.25	16.75	3.25	17.25	3.75	17.75	2.50								
Lorain *N2*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.75	+16.0	2.25	+13.50	7.25	+8.50

Threads only, buttweld and seamless 2½ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 10¢ per lb.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.68	T-1
18	4	1	—	5	2.385	T-4
18	4	2	—	—	1.185	T-2
1.5	4	1.5	8	—	1.04	M-1
6	4	3	6	—	1.43	M-3
6	4	2	5	—	1.185	M-2

High-carbon chromium	.83	D-3, D-5
Oil hardened manganese	.45	O-2
Special carbon	.41	W-1
Extra carbon	.345	W-1
Regular carbon	.29	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

Stainless Type	Cladding	Plate (*A3, J2, L4*) 10 pct	15 pct	20 pct	Sheet (*I3*) 20 pct
302		.....	.....	.....	37.50
304		37.95	42.25	46.70	40.00
316		44.40	49.50	54.50	58.75
321		40.05	44.60	49.30	47.25
347		42.40	47.55	52.80	57.00
405		29.85	33.35	36.85	.....
410		29.55	33.10	36.70	.....
430		29.80	33.55	37.25	.....

CR Strip (89) Copper, 10 pct, 2 sides, 40.25; 1 side, 33.95.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	.....	9.625	.....
Armature	11.10	10.85	11.35
Elect.	11.80	11.55	12.05
Hermetic	.....	12.10	.....
Motor	12.90	12.65	13.15
Dynamo	13.95	13.70	14.20
Trans. 72	15.00	14.75	15.25
Trans. 65	15.55	Grain Oriented	
Trans. 58	16.85	Trans. 80	19.20
Trans. 52	17.10	Trans. 73	19.70

Producing points: Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*N5*); Niles, O. (*N3*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1957 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Am'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	...	212	193	8.65	9.20
Aliquippa *J3****	173	190	...	...	190	8.65	9.325
Atlanta *A8***	175	...	...	208	199	8.50	9.10
Bartonville *K2***	175	192	178	214	198	8.75	9.425**
Buffalo *W6*	...	...	...	...	...	8.65	8.95*
Chicago *N4****	...	...	...	...	...	...	...
Cleveland *A6*	...	...	...	...	...	...	...
Cleveland *A5*	...	...	...	...	...	8.65	...
Crawf'dsv. *M4***	175	192	...	214	198	8.75	9.425
Donora, Pa. *A5*	173	187	...	212	193	8.65	9.20
Duluth *A5*	173	187	...	212	193	8.65	9.20
Fairfield, Ala. *T2*	173	187	...	212	193	8.65	9.20
Galveston *D4*	8.95‡	...	...	...	...	...	...
Houston *S2*	178	192	...	217	198	8.90	9.45
Jacksonville *M4*	184-1	197	...	219	203	9.00	9.675
Johnstown *B3****	173	190***	172	...	196**	8.65	9.325**
Joliet, Ill. *A5*	173	187	...	212	193	8.65	9.20
Kokomo *C9**	175	189*	...	214	195*	8.75	9.30*
L. Angeles *B2****	...	...	...	...	...	9.60	10.275
Kansas City *S2**	178	192*	...	217	198*	8.90	9.45*
Minnequa *C6*†	178	192†	177	217	198†	8.90	9.45†
Monessen *P6*	...	...	...	...	193	8.65	9.20
Palmer, Mass. *W6*	...	...	...	...	...	8.95	9.50*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.60	10.15
Rankin, Pa. *A5*	173	187	...	...	193	8.65	9.20
Sa. Chicago *R3*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*†	...	...	...	236	...	9.60	10.15†
Sparrows Pt. *B3***	175	...	...	214	198	8.75	9.425
Struthers, O. *Y1**	...	...	...	...	...	8.65	9.30
Worcester *A5*	179	...	...	...	...	8.95	9.50
Williamsport *S5*	...	...	...	...	...	...	...

* Zinc less than .10¢.
** 11-12¢ zinc.
*** .10¢ zinc.
† Plus zinc extras.
‡ Wholesalers only.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.00-1.35
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*	...	...	...	...	...
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	...	...
Detroit *D1*	9.05	10.50	12.70	15.70	...
Detroit *D2*	9.05	10.50	12.70	...	...
Dover, O. *C4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	...	...
Franklin Park, Ill. *T8*	9.05	10.25	12.45	15.45	18.40
Harrison, N. J. *C11*	...	...	12.90	16.10	19.30
Indianapolis *J3*	9.10	10.55	12.60	15.60	18.55
Los Angeles	11.15	12.60	14.80	17.80	...
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	...
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	...
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Pittsburgh *S7*	8.95	10.40	12.60	15.60	18.55
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton *R4*	...	10.70	12.90	16.10	19.30
Wallingford *W1*	9.40	10.70	12.90	15.90	18.75
Warren, Ohio *T4*	...	...	...	...	...
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *J3*	8.95	10.40	12.60	15.60	18.55

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox	2	13	36.34	42.56	35.22
	2½	12	48.94	57.31	47.43
	3	12	56.51	66.18	54.77
	3½	11	65.97	77.25	63.93
	4	10	87.61	102.59	85.53
National Tube	2	13	36.34	42.56	35.22
	2½	12	48.94	57.31	47.43
	3	12	56.51	66.18	54.77
	3½	11	65.97	77.25	63.93
	4	10	87.61	102.59	85.53
Pittsburgh Steel	2	13	36.34	42.56	.....
	2½	12	48.94	57.31	.....
	3	12	56.51	66.18	.....
	3½	11	65.97	77.25	.....
	4	10	87.61	102.59	.....

WAREHOUSES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge	Sheets: Hot-Rolled (18 ga. & hvr.)	Sheets: Cold-Rolled (15 ga.)	Sheets: Galvanized (10 ga.)††	Strip: Hot-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled (merchant)	Bars: Cold-Finished	Alloy Bars: Hot-Rolled 4615 As rolled	Alloy Bars: Hot-Rolled 4140 Annealed	Alloy Bars: Cold-Drawn 4615 As rolled	Alloy Bars: Cold-Drawn 4140 Annealed
Atlanta		8.59	9.87	10.13	8.64	8.97	9.05	9.01	10.68	.....	.....	.....	.....
Baltimore	$.10	8.38	8.88	9.86	8.86	8.76	9.29	9.16	9.73	16.18	15.18	19.73	18.98
Birmingham	.15	8.18	9.45	10.15	8.23	8.56	8.64	8.60	10.57	.....	.....	.....	.....
Boston	.10	9.41	10.50	11.15	9.45	9.75	9.69	9.78	.....	15.79	15.24	19.89	19.04
Buffalo	.15	8.48	9.60	11.22	8.65	9.05	8.65	8.95	8.85	16.34	15.15	19.01	18.95
Chicago	.15	8.35	9.60	10.15	8.38	8.71	8.79	8.75	8.95	15.80	14.65	19.35	18.40
Cincinnati	.15	8.49	9.65	10.28	8.69	9.08	9.33	9.07	9.46	15.61	15.11	18.96	18.91
Cleveland	.15	8.33	9.60	10.10	8.48	8.94	9.16	8.84	9.20	15.89	14.74	19.44	18.54
Denver	.20	9.70	11.30	12.49	9.80	9.70	9.80	9.95	10.65	.....	.....	.....	17.60
Detroit	.15	8.58	9.85	10.50	8.73	9.06	9.33	9.05	9.30	15.46	15.06	18.81	18.86
Houston		8.45	9.75	.....	8.60	9.05	9.10	9.05	11.10	16.20	.....	19.30	19.05
Kansas City	.20	8.52	9.72	10.07	8.60	8.83	8.87	9.22	9.42	15.32	14.77	18.72	18.42
Los Angeles	.10	9.60	10.85	11.75	9.65	9.65	9.70	9.80	12.85	17.25	15.00	21.05	19.25
Memphis	.15	8.02	9.22	.....	8.12	8.35	8.39	8.25	9.85	.....	.....	.....	.....
Milwaukee	.15	8.48	9.73	10.28	8.51	8.84	9.00	8.88	9.18	15.43	14.93	18.78	18.73
New York	.10	8.97	10.23	10.66	9.42	9.53	9.45	9.67	.....	15.02	15.19	18.42	18.99
Norfolk	.20	8.90	.....	.....	8.40	8.35	8.70	8.45	10.70	.....	.....	.....	.....
Philadelphia	.10	8.10	9.00	9.97	8.79	8.87	8.60	8.75	9.41	15.61	15.11	18.96	18.91
Pittsburgh	.15	8.33	9.60	10.50	8.48	8.71	8.79	8.75	9.20	15.80	14.80	19.35	18.60
Portland		8.50	11.20	11.55	11.35	9.30	9.60	8.65	14.65	18.50	16.10	20.75	20.25
San Francisco	.10	9.45	10.85	11.10	11.05	9.70	9.60	9.80	13.10	17.05	16.10	21.05	20.35
Seattle		9.95	11.15	12.00	10.00	9.70	9.80	10.10	14.05	16.55	15.85	20.65	19.45
Spokane	.15	10.10	11.30	12.15	10.15	9.85	9.95	10.25	14.20	.....	17.25	21.55	21.05
St. Louis	.15	8.69	9.94	10.51	8.74	9.08	9.25	9.12	9.56	15.66	15.01	19.01	18.81
St. Paul	.15	8.94	10.19	10.76	8.99	9.45	9.59	9.51	9.81	.....	15.26	.....	19.06

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other or with galvanized sheets for quantity.

†† 10¢ zinc. ‡Deduct for country delivery

(Effective Sept. 3, 1957)

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.525	6.50	6.975				
Cleveland *R3*							14.75
So. Chicago *R3*				9.75			
Ensley *T2*	5.525	6.50					
Fairfield *T2*		6.50		9.75		6.60	
Gary *U1*	5.525					6.60	
Huntington *C16*		6.50					
Ind. Harbor *I3*	5.525		6.975	9.75		6.60	
Ind. Harbor *Y1*				9.75			
Johnstown *B3*		6.50					
Joliet *U1*			6.975				
Kansas City *S2*				9.75			14.75
Lackawanna *B3*	5.525	6.50	6.975			6.60	
Lebanon *B3*			6.975		14.50		14.75
Minnequa *C6*	5.525	7.00	6.975	9.75		6.60	14.75
Pittsburgh *P5*							14.75
Pittsburgh *J3*				9.75			15.25
Seattle *B2*				10.25		6.75	
Steelton *B3*	5.525		6.975			6.60	
Struthers *Y1*				9.75			
Torrance *C7*						6.75	
Williamsport *S5*		6.50					
Youngstown *R3*				9.75			

COKE

Furnace, beehive (f.o.b. oven) Net-Ton
Connellsville, Pa. ..... $15.00 to $15.75
Foundry, beehive (f.o.b. oven)
$17.50 to $19.00

Foundry oven coke
Buffalo, del'd $31.75
Detroit, f.o.b. 30.50
New England, del'd 31.55
Kearney, N. J., f.o.b. 29.75
Philadelphia, f.o.b. 29.50
Swedeland, Pa., f.o.b. 29.50
Painesville, Ohio, f.o.b. 30.50
Erie, Pa., f.o.b. 30.50
Cleveland, del'd 32.65
Cincinnati, del'd 31.84
St. Paul, f.o.b. 29.75
St. Louis, f.o.b. 31.50
Birmingham, f.o.b. 28.85
Milwaukee, f.o.b. 30.50
Neville, Is., Pa. 29.25

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE			CARBON*		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	24.75	40	100, 110	10.70
20	72	24.00	35	110	10.70
16 to 18	72	24.50	30	110	10.85
14	72	25.00	24	72 to 84	11.25
12	72	25.50	20	90	11.00
10	60	26.50	17	72	11.40
10	48	27.00	14	72	11.85
7	60	26.75	12	60	12.95
6	60	30.00	10	60	13.00
4	40	33.25	8	60	13.30
3	40	35.25			
2½	30	37.25			
2	24	57.75			

* Prices shown cover carbon nipples.

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper
Cast elliptical, 18 in. or longer, 5000 lb lots 45.75
Electrodeposited 37.00
Brass, 80-20, ball anodes, 2000 lb or more 48.00
Zinc, ball anodes, 2000 lb lots 18.00
(for elliptical add 2¢ per lb)
Nickel, 99 pct plus, rolled carbon, 5000 lb 102.25
(Rolled depolarized add 3¢ per lb)
Cadmium 1.70
Tin, ball anodes and elliptical $1.07 per in.

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum 74.80
Copper sulphate, 100 lb bags, per cwt. 24.35
Nickel salts, single, 100 lb bags 40.50
Nickel chloride, freight allowed, 300 lb 45.50
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums 23.05
(Philadelphia price 23.30)
Zinc cyanide, 100 lb 59.00
Potassium cyanide, 100 lb drum N. Y. 48.00
Chromic acid, flake type, 100,000 lb or more 31.00

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)
Pct. Discounts

Machine and Carriage Bolts	Full Container Price	30 Containers	20,000 Lb.	40,000 Lb.
½" and smaller x 6" and shorter	49	54	56	57
⅝" thru 1" x longer than 6"	35	40	43	45
Rolled thread carriage bolts ½" & smaller x 6" and shorter	49	54	56	57
Lag, all diam. x 6" & shorter	49	54	56	57
Lag, all diam. longer than 6 in.	39	44½	47	48½
Plow bolts, ½" and smaller x 6" and shorter	49	54	56	57

(Add 25 pct for broken case quantities)

Nuts, Hex, HP reg. & hvy.	Full case or Keg price
¾ in. or smaller	60½
⅞ in. to 1 in. inclusive	55½
1⅛ in. to 1½ in. inclusive	58½
1⅝ in. and larger	53½

C. P. Hex reg. & hvy.

¾ in. and smaller	60½
⅞ in. to 1½ in inclusive	55½
1⅝ in. and larger	53½

Hot Galv. Hex Nuts (All Types)

¾ in. and smaller 46½

Semi-finished Hex Nuts

⅝ in. or smaller	60½
¾ in. to 1½ in. inclusive	55½
1⅝ in. and larger	53½

(Add 25 pct for broken case or keg quantities)

Finished

⅞ in and smaller 63

Rivets

Base per 100 lb
½ in. and larger $12.25
Pct. Off List
7/16 in. and smaller 19

Cap Screws

Discount (Packages)

	Full Finished H. C. Heat Treat	C-1018 Steel Full-Finished Cartons Bulk
New std. hex head, packaged		
⅝" diam. and smaller x 6" and shorter	40	26
¾", ⅞", and 1" diam. x 6" and shorter	22	3
⅝" diam. and smaller x longer than 6"	8	+13
¾", ⅞", and 1" diam. x longer than 6"	+ 6	+32
¼" through ⅝" dia. x 6" and shorter	58	49
¾" through 1" dia. x 6" and shorter	45	33

Minimum quantity—¼" through ⅝" diam., 15,000 pieces; 1/16" through ⅝" diam., 5,000 pieces; ¾" through 1" diam., 2,000 pieces.

Machine Screws & Stove Bolts

Plain Finish	Quantity	Discount Mach. Screws	Discount Stove Bolts
Cartons		19	32
Bulk			
To ¼" diam. incl.	25,000-200,000	9	54
5/16 to ½" diam. incl.	25,000-200,000	9	54
All diam. over 3" long	5,000-100,000	—	54

Machine Screws & Stove Bolt Nuts

	Quantity	Discount Hex	Discount Square
In Cartons		16	19
In Bulk			
⅜" diam. & smaller	15,000-100,000	7	9

CAST IRON WATER PIPE INDEX

Birmingham 119.0
New York 131.7
Chicago 134.1
San Francisco-L. A. 141.8
Dec. 1955 value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

REFRACTORIES

Fire Clay Brick

Carloads per 1000

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5.00) $135.00
No. 1 Ohio 120.00
Sec. Quality, Pa., Md., Ky., Mo., Ill. 120.00
No. 2 Ohio 103.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $2.00) $21.50

Silica Brick

Mt. Union, Pa., Ensley, Ala. $150.00
Childs, Hays, Pa. 155.00
Chicago District 160.00
Western Utah 175.00
California 180.00
Super Duty
Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville 157.00-160.00
Silica cement, net ton, bulk, Latrobe 28.50
Silica cement, net ton, bulk, Chicago 25.50
Silica cement, net ton, bulk, Ensley, Ala. 26.50
Silica cement, net ton, bulk, Mt. Union 24.50
Silica cement, net ton, bulk, Utah and Calif. 37.00

Chrome Brick *Per net ton*

Standard chemically bonded, Balt. $105.00
Standards chemically bonded, Curtiner, Calif. 115.00
Burned, Balt. 99.00

Magnesite Brick

Standard, Baltimore $131.00
Chemically bonded, Baltimore 116.00

Grain Magnesite St. ⅜ to ½-in grains

Domestic, f.o.b. Baltimore in bulk. $73.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.
in bulk 46.00
in sacks 52.00-54.00

Dead Burned Dolomite *Per net ton*

F.o.b. bulk, producing points in:
Pa., W. Va., Ohio $16.75
Midwest 17.00
Missouri Valley 15.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh

Swedish sponge iron, del. East of Miss. River, ocean bags, 23,000 lb. and over ..... 10.5¢
F.O.B. Riverton or Camden, New Jersey, West of Miss. River .... 9.5¢
Domestic sponge iron, 98+% Fe, 23,000 lb. and over del'd East of Miss. River ..... 10.5¢
F.O.B. Riverton, New Jersey, West of Miss. River ..... 9.5¢
Canadian sponge iron, del'd in East, carloads ..... 9.5¢
Electrolytic iron, annealed, imported 99.5+% Fe .... 27.5¢
domestic 99.5+% Fe .... 36.5¢
Electrolytic iron, unannealed minus 325 mesh, 99+% Fe 57.0¢
Electrolytic iron melting stock, 99.84% pure ..... 22.0¢
Carbonyl iron size 3 to 20 micron, 98%, 99.8+% Fe.. 88.0¢ to $2.90
Aluminum, freight allowed.. 38.00¢
Brass, 10 ton lots ..... 37.4¢ to 41.5¢
Copper electrolytic ..... 45.75¢
Copper, reduced ..... 49.75¢
Cadmium, 100-199 lb. 95¢ plus metal value
Chromium, electrolytic, 99.85% min. Fe. 03 max. Del'd ... $5.00
Lead ..... 8.90¢ plus metal value
Manganese f.o.b. Extron, Pa. 46.0¢
Molybdenum, 99% ..... $3.60 to $3.95
Nickel, chemically precipitated $1.05
Nickel, unannealed $1.00
Nickel, annealed $1.06
Nickel, spherical, unannealed #80 ..... $1.13
Silicon ..... 43.50¢
Solder powder.7.0¢ to 9.0¢ plus met. value
Stainless steel, 302 ..... $1.02
Stainless steel, 316 ..... $1.20
Tin ..... 14.00¢ plus metal value
Tungsten, 99% (65 mesh) $3.75 (nominal)
Zinc, 10 ton lots ..... 18.5¢ to 31.7¢

FERROALLOY PRICES

(Effective Sept. 3, 1957)

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, .30-1.00% max. Si.

0.02% C....	41.50	0.20% C.... 38.50
0.03% C....	41.00	0.50% C.... 38.25
0.06% C....	39.50	1.00% C.... 37.50
0.10% C....	39.00	1.50% C.... 37.35
0.15% C....	38.75	2.00% C.... 37.25

4.00-4.50% C, 67.70% Cr, 1-2% Si... 27.75
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si 26.50
0.025% C (Simplex) 34.75
0.10% C, 50-52% Cr, 2% max Si.... 35.50
8.50% max. C, 50-55% Cr, 3-6% Si.. 24.00
8.50% C, 50-55% Cr, 3% max. Si... 24.00

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max 0.10% C price schedule. Add 5¢ for each additional 0.25% of N.

Chromium Metal

Per lb chromium, contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C	$1.31
0.50% max. C	1.31
9 to 11% C, 88-91% Cr, 0.75% Fe...	1.40

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads	$1.29
Ton lots	1.31
Less ton lots	1.33

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.) Carloads, delivered, lump, 3-in. x down, per lb of Cr, packed.

Carloads	44.65
Ton lots	48.95
Less ton lots	51.45

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads	25.65
Ton lots	27.95
Less ton lots	29.45

Calcium-Manganese—Silicon

Cents per lb of alloy, lump, delivered, packed.
16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	24.25
Ton lots	26.15
Less ton lots	27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20 % Fe ½ in. x 12 mesh.

Ton lots	20.15
Less ton lots	21.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots	17.20
Ton lots	18.70
Less ton lots	19.95

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	12.75
Johnstown, Pa.	12.75
Sheridan, Pa.	12.75
Philo, Ohio	12.75
S. Duquesne	12.75

Add or substract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk	14.80
Ton lots packed	17.20

Spiegeleisen

Per gross ton, lump, f.o.b. Palmerton, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$100.50
19 to 21%	3% max.	102.50
21 to 23%	3% max.	105.00

Manganese Metal

2 in. x down, cents per pound of metal delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads	34.00
Ton lots	36.00
250 to 1999 lb.....	38.00
Premium for Hydrogen-removed metal	0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 25.50

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	33.60	36.40	37.60
0.30% max. C	32.10	34.90	36.10
0.50% max. C	31.60	34.40	35.60
0.75% max. C, 80.85% Mn, 5.0-7.0% Si ...	28.60	31.40	32.60

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.

Carloads bulk	12.80
Ton lots, packed	14.45
Briquet contract basis carloads, bulk, delivered, per lb of briquet	15.10
Ton lots, packed, pallets	16.50

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots, packed	Carloads, packed
96.75% Si, 1.25% Fe..	22.20	20.90
98% Si, 0.75% Fe	22.95	21.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.

Carloads, bulk	7.70
Ton lots, packed	10.50

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si....	13.00	75% Si....	16.40
65% Si....	15.25	85% Si....	18.10
	90% Si....	19.50	

Ferrovanadium

50-55% V delivered, per pound, contained V, carloads, packed.

Openhearth	3.20
Crucible	3.30
High speed steel (Primos)	3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots..	2.40	3.30	4.55

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads	10.65¢
Ton lots	11.80¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.28

Ferrocolumbium, 50-50%, 2 in. x D, delivered per pound contained Cb.

Ton lots	$4.90
Less ton lots	4.95

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Sb plus Ta $4.25

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.68

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $4.00 unitage, per gross ton $90.00
10 tons to less carload $110.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $240.00

Ferrotungsten, ¼ x down packed, per pounds contained W, ton lots delivered ..... $2.60 (nominal)

Molybdic oxide, briquets per lb contained Mo, f.o.b. Langeloth, Pa. $1.41
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.33

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed, per lb.

Carload, bulk lump	18.50¢
Ton lots, packed lump	20.50¢
Less ton lots	21.00¢

Vanadium oxide, 86-89% V_2O_5, per pound contained V_2O_5 .... $1.38

Zirconium, per lb of alloy

35-40% f.o.b. freight allowed, carloads, packed	27.25¢
12-15%, del'd lump, bulk-carloads	9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B
2000 lb carload $5.50

Bortam, f.o.b. Niagara Falls,

Ton lots per pound	45¢
Less ton lots, per pound	50¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.
Ton lots per pound ..... 14.00¢

Ferroboron, 17.50 min. B, 1.50% bax. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots.... $1.30
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up

10 to 14% B	.85
14 to 19%	1.20
19% min. B	1.50

Grainal, f.o.b. Bridgeville, Pa., freight, allowed, 100 lb and over

No. 1	$1.05
No. 79	50¢

Manganese-Boron, 75.00% Mn, 15.20% B, 5% ma. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots	$1.46
Less ton lots	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% ma. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots $2.15

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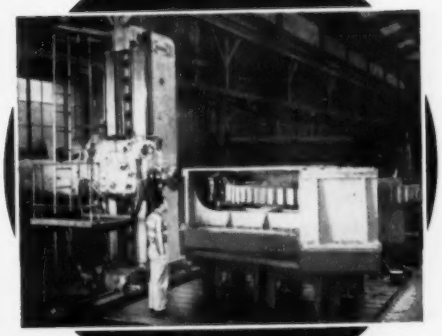

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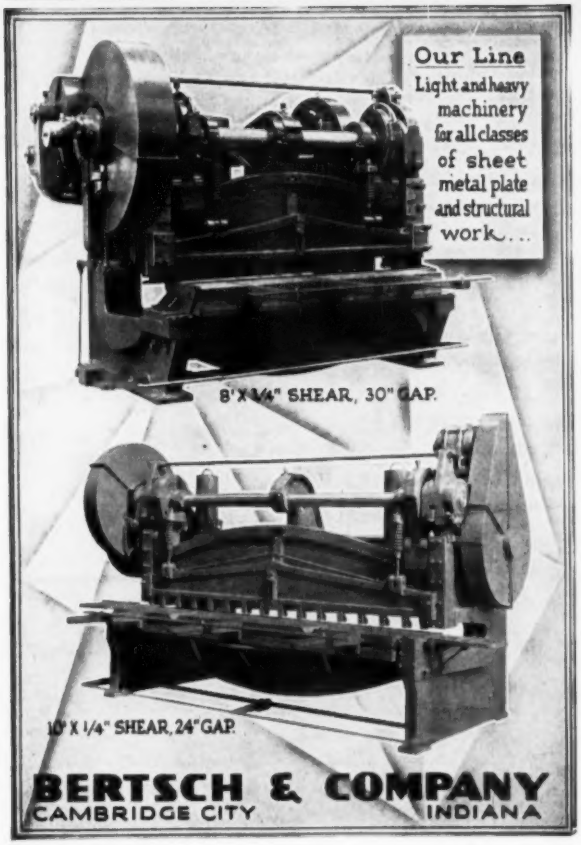
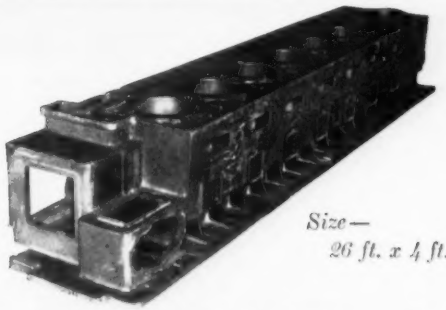


BERTSCH & COMPANY
CAMBRIDGE CITY INDIANA



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26 ft. x 4 ft.

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"ANYTHING containing IRON or STEEL"

Over Market Prices Paid at Auctions

Used machinery dealers continue puzzled by high prices independent buyers pay.

Sometimes the same equipment is for sale from dealer stocks at lower levels.

▪ With Cleveland area used machinery business slowed to a walk, biggest dealer interest is centered on the high prices independent bidders are paying at auctions.

"Recently there were four triple action mechanical presses sold at auction in Detroit for over $100,000," one dealer said. "These could have been bought from several dealers' warehouses on a delivered basis, with convenient payments and fully guaranteed. And the price would have been substantially below $100,000," he added. "The same is true of some automatic screw machines I saw auctioned for more than I sold them the week before."

Bidders Carried Away—"A lot of bidders are getting carried away at the auctions and paying well over market prices. They have to plunk down a certified check for one-fourth the price on the spot and see to their own delivery. And there's no guarantee behind their own inspection.

"We generally only make a token appearance at the auctions now. Most dealers only hang around hoping to pick off a few bargains here and there which get past the independents. It's about all we can do."

Uneven Inventories — Federal government belt-tightening is shaking loose a good deal of stored machinery although the general market is slow. Two or three major auctions in the next few months will dispose of up to 1000 machines each. Most are high production and special types suited only for specific jobs. Generally a lot of 1000 will have about 50 standard machines which are most valued by dealers and independent bidders.

Despite the rush of business at auctions, dealer inventories in the Cleveland area at least are still not well rounded. Many machine shop operators are trying to raise a little more capital by unloading some seldom-used machinery but they invariably want to hang on to their best models so the machines offered are not much use to the dealer.

Buyers Lack Capital—The big sales problem at the moment is not lack of models to sell but capital on the part of buyers. Sales now are in direct ratio to how far the dealer wants to stick his neck out on credit.

Larger companies are watching and waiting to see how the general business trend goes before they add more machinery. Apparently a business upsurge could bring out a lot of reserve buying power.

Collections on machinery bought on loan are also going well. One firm has not had a repossession in 6 years. Payments are very good even on the short term 30-60-90 day type of equipment loan.

Rentals Popular — The lack of buyer capital is also stimulating equipment rentals, some with an option to purchase. Dealers are offering such items as millers, sheet metal working machinery, squaring shears, punch presses and press brakes on a rental basis.

CONSIDER GOOD USED EQUIPMENT FIRST

BENDING ROLLS
10' x 10" Ga. Bertsch Initial Type
10' x ½" Kling Pyramid Type—LATE
16' x ¾" Bansome, Pyramid Type
18' x 1" Nyles Pyramid Type
20' x 1" Hilles & Jones Pyramid Type
8' x 3/16" Dreis & Krump
BRAKES—LEAF TYPE
12' x ⅛" Dreis & Krump
12' x ½" Dreis & Krump No. 228
BRAKES—PRESS TYPE
12' x ½" Cincinnati
CRANES—OVERHEAD ELECTRIC TRAVELING

3 ton	P&H	56' Span 230/3/60
5 ton	Whiting	48' Span 220/3/60 A.C.
5 ton	Case	59' Span 220/3/25
8 ton	P&H	55' Span 220/3/60
10 ton	Shepard Niles	38' Span 440/3/60
15 ton	Shepard Niles	52' Span 230 Colt D.C.
15 ton	Shepard Niles	55' Span 220/440 A.C.
15 ton	Niles	75' Span 220/3/60
20 ton	P&H	57' Span 220/440 A.C.

DRAW BENCH
10,000# Aetna Standard Single Draw Tube Draw Bench 44 Ft. Max. Length of Draw
FORGING MACHINES
1" to 5" Acme Ajax, National
LEVELLERS—ROLLER
48" Aetna 17 Rolls 3¾ dia.
66" Aetna 17 Rolls 4¾" dia.
PLANER—PLATE EDGE
35' Southwark, 16 Pneu. Jacks, Capy. 1¼"
HAMMERS—BOARD DROP—STEAM DROP—STEAM FORGING

800, 1600 lb. Chambersburg J-2	Board Drop
1200, 1500 lb. Chambersburg	Board Drop
2000 lb. Erie Type FV	Board Drop
2000 lb. Chambersburg Model E	Steam Drop
2000, 25000 lb. Erie	Steam Drop
3000 lb. Niles-Bement-Pond	Steam Drop
4000 lb. Chambersburg	Steam Drop
1100 lb. Erie Single Frame	Steam Forging
1500 lb. Chambersburg Sgle Fr	Steam Forging
20,000 lb. Massey Arch Frame	Steam Forging
48" x 48" Chambersburg	Coco Stamp

PRESSES—HYDRAULIC
500 ton HPM Fastraverse, Bed 36"x36"
1500 ton Bliss, 15" Stroke, Bed 49"x48"
1500 ton Mesta Steam Hydr. Forging Press
2000 ton Bliss 18" Stroke Bed Area 54"x55"
4500 Baldwin-Lima-Hamilton Hydr. Forging Press
PRESSES—STRAIGHT SIDE
100 ton Clearing F1100, 14" Str. Bed 36x36"
180 ton Hamilton #847, 12" Str. 85½" Bet. Ups.
200 ton Clearing F1200-42, Stroke 30", Bed 44"x38"
250 ton Bliss #88 12" Str. Bed 29"x29"
250 ton Bliss #81 7½" Str. Bistr 33"x39"
PUNCH—BEAM
W&W #11 Beam Punch, Capacity Beams 12"-30"
PUNCH & SHEAR COMBINATIONS
Cleveland Style G Single End, 60" Throat
Cleveland Style W, 60" Throat
No. 1½ Buffalo Universal Ironworker
ROLLING MILLS
6' x 5" Torrington Wire Flattening Mill Line
8" x 10 Schmitz Single Stand Two High
10" x 14" Single Stand Two High
10" x 16" Single Stand Two High
12" x 12" Single Stand Two High
12" x 16" Single Stand Two High
16" x 30" Farrel Two Stand Two High
20" x 36" Single Stand Two High
26" x 72" Cold Rolling Mill
SHEAR—ALLIGATOR
No. 4 Mesta RH LK, Capacity 2" x 12"
SHEAR—GATE
12' x ⅜" Niagara Model 1212, NEW 1951
SHEAR LINES
36" Halden Shear Line Leveler, Classifier, etc.
60" Shear Line, With Leveler & Tables
96" x 14 Ga. Cleveland, With Playoff Leveler, Elect.
SHEARS—SQUARING
6' x 10 Ga. Niagara No. 672
8' x ¼" Niagara—NEW 1952
10' x ¼" Cincinnati #1810
10' x ⅜" Cincinnati #2510
SHEARS—ANGLE
6 x 6 x ⅝ Hilles & Jones
6 x 4 x ⅝" Long & Allstatter
SLITTERS
24" Yoder Slitting Line
36" Paxon Slitting Line
42" Illinois, 1¼" Shaft Dia.
STRAIGHTENERS
No. 3 Medart 3 Roll, Capacity to 4½" Tubing
Kane & Roach Roll Straightener & Cut-off Capacities 7/16" to ⅝" Hex. Bars
SWAGING MACHINES
#1 Fenn, Capacity 2⅝" Tubing, LATE
#6½A Fenn, Capacity 2¼" Tube 3⅜" Solid 10" Die Length Hydraulic Feed, LATE
WELDERS—SEAM
200 KVA Progressive Universal 220 Volt
400 KVA Federal Circular 440 Volt
500 KVA Federal Longitudinal 440 Volt
WIRE MACHINERY
#2 Vaughn 12-Die Continuous Wire Drawing Machine. Capacity 14 to 27 B&S Ga.
4—Block Vaughn Wire Drawing Machine 22" Diameter Blocks

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REBUILT — GUARANTEED ELECTRICAL EQUIPMENT

MOTOR GENERATOR SETS

Qu.	KW	Make	RPM	D.C. Volts	A.C. Volts
5	1500	Al.Ch.	514	250/700	13800/6900/4160
1	1500	G.E.	514	250	2300/4000
1	1450	Whse.	900	600	2200/4000
2	1250	Al.Ch.	720	600	2300/4000
1	850	G.E.	720	240/250	2300
1	725	Whse.	900	600	2300/4000
1	500	Cr.Wh.	720	600	2300/440
1	500	G.E.	900	250	2300
4	300	Whse.	1200	125/250	2300
1	300	Al.Ch.	1200	250/700	2300
(3-unit)					
2	200	Whse.	1200	125/250	2300/440
3	150	Rel.	1200	125	2300/440
1	150	Whse.	1200	125/250	2300/440
1	150	G.E.	1200	250	4600/2300
1	100	Whse.	720	125/250	230
1	75	Whse.	1200	125/250	2300

2—400 KW. G.E. sealed Ignitron Mercury Arc Rectifiers complete with AC and DC switchgear and 475 KVA Pyranol Transf. 2400 V, 3 ph., 60 cycle.

DIRECT CURRENT MOTORS
230-Volt

Qu.	H.P.	Make	Type	R.P.M.
1**	1500	Whse.	Encl.	600
1**	700	Whse.	Encl.	143
1	700	Whse.	Encl.	300/700
2**	600	Whse.	Mill	300/1600
2	600	GM	GM	110/230
1	400	G.E.	MPC	450
1	300	Whse.	Mill	380/900
1	300	Whse.	Mill	300
2	275	Whse.	GM	425/850
1	200/250	El.Dy.	Ped. Brg.	400/1200
1	180	G.E.	MPC	400
1	175	G.E.	CD-175-A	850/1025
1	125	Whse.	SK-184	575/850
1	80	Rel.	451-T	575/1150
1	80	El.Dy.	26-S	525/1050
1	60/75	Whse.	SK-151	250/1000
1	50	Whse.	SK	500/1500
1	50	Whse.	SK-141	250/1000
2	30/40	Whse.	SK-143	500/1500
1	35	Whse.	SK	250/1000
1	32½	Whse.	SK-130	400/1200
1	25	Whse.	SK-121	200/1200
3	15	Whse.	SK-93	575/1725
3	5/7½	Rel.	T.E.F.C.	337/1350

**—660 volts
All others—230 volts

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Cable Address: "Mucsteel" Philadelphia, Pa.
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2000# Chambersburg Pneumatic Forging Hammer, Late Type, Serial 20CH392L7.

4000 lb. Chambersburg Double Frame Steam Forg. Hammer

2500 lb. Erie Single Leg Steam Forg. Hammer

Pels FV-75 All Steel Billet Shear Cap. 7⅝" Rd.

United Engineering & Fdry. Alligator Shear Clutch operated; Cap. 6½" Sq.

3—2-ton Denison Auto. Hopper Feed & Index Table Hydr. Multipress

2500 lb. Model E Chambersburg Steam Drop Hammer, New 1944

6' x 10 ga. Cincinnati Squaring Shear

¼" x 8' Pexto Gate Shear; 20" throat

4" National High Duty Upsetting & Forging Machine, air clutch, also one with regular clutch, also 1", 2", 3" air clutch

Williams White Bulldozers from 5-ton to 300-ton

Landis Landmaco and other Landis Threading Machines

Single & Double End Punches

No. 3 Motch & Merryweather Saw, with Saw Grinder

Conomatic, 4 Spin. Cap. 1½" Rd.

BOLT, NUT AND RIVET MACHINERY, COLD HEADERS, THREAD ROLLERS, THREADING MACHINES, TAPPERS, COLD BOLT TRIMMERS, SLOTTERS, HOT HEADERS AND TRIMMERS, COLD AND HOT PUNCH NUT MACHINES.

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1919 W. 74th Street, Chicago 36, Ill.

RE-NU-BILT
GUARANTEED
ELECTRIC POWER EQUIPMENT

DC MOTORS

Qu.	H.P.	Make	Type	Volts	RPM
1	3900	Elliott		475	320
1	2250	Elliott		600	200/300
1	2200	G.E.	MCF	600	400/500
1	1750	Elliott		250	175/350
1	1375	G.E.	MCF	415	1300
1	1200	G.E.	MCF	600	450/600
1	940	Whse.	QM	250	140/170
3	800	G.E.	MCF	250	400/750
1	450	Whse.		550	415
2	300	G.E.	MPC	230	400
2	200	Whse.	CB-207.4	250	850/1200
2	125	Whse.	SK-190	230	450/1200
1	150	G.E.	CDBB	600	250/700
1	150	Cr. Wh.	65-H	230	1150
1	125	Whse.	SK-185	230	350/1650
1	125	Whse.	SK-183	230	850
2	100	Whse.	SK-181	230	450/1000
1	60/100	G.E.	RF-17	230	450/900
1	75	G.E.	CD-1231	230	850
2	75	Cr. Wh.	53HTEFC	230	860
1	50	G.E.	MD-412-AE	230	550
6	40	Rel. BB	285FTEFC	230	500/1500
2	30/40	Whse. D.P.	SK-131.5-BB	230	500/1500
3 (unused)	30	G.E.	CDM-85-BB	230	2200

MG SETS—3 Ph. 60 Cy.

Qu.	K.W.	Make	RPM	DC Volts	AC Volts
2	2000/2400	G.E.	450	250/300	2300/4600
1	2000	G.E.	514	600	2300/4600
2	1750/2100	G.E.	514	250/300	2300/4600
2	1600	G.E.	720	600	6600/13200
1	750	G.E.	720	125/250	2300/4600
1	500	Whse.	900	125/250	440
1	500	G.E.	900	125/250	440/2300
2	300	G.E.	1200	250	2300
1	300	Whse.	1200	275	440/2300
1	250	Whse.	1200	275	2300
1	200	El.Ma.	1200	250	2300/4600
1	200	Whse.	1200	550	2300
1	200	G.E.	1200	250	440

TRANSFORMERS

Qu.	KVA	Make	Type	Ph.	Voltages
3	3333	Whse.	OISC	1	13800 x 2300
1	3000	A.C.	OISC	3	33000 x 2300
1	1500	G.E. auto	HT	3	4000/4200/4400
3	1000	G.E.	HVDDI	1	2400 x 480
3	1000	G.E.	OA/FA	1	13800 x 230/460
1	833	G.E.	H	1	13800 x 460
2	750	G.E.	Pyranol	1	4800 x 83/55
3	500	Kuhl	OISC	1	13200 x 6600
3	500	Kuhl		1	4800/2400 x 240/480
1	300	G.E.	HT	3	4160 x 480/277
3	200	Al. Ch.	OISC	1	2300 x 230/460
3	150	G.E.		1	33000 x 2300/4000Y

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B & S No. 13 Gear Cutter.
Gleason 3" Str. Bevel Gear Gen.
Besley No. 372 Disc. Grinder, 1947.

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4357 St. Paul Blvd. Rochester 17, N. Y.

1—34" REVERSING HOT STRIP MILL CONSISTING OF:

1—Slab re-heating furnace 44" wide x 93'4" long, 4 heating zones, oil and gas burners.

1—Mill drive motor, reversing, 2500 HP, 75/150 RPM, 600 volt D.C., with controls.

1—28" x 40" 2-high reversing mill having Morgoil bearings in roll stand, Timken bearings in pinion stand, universal spindles with carriers, 75 HP motor screw-down.

2—Re-heating coiling furnaces, each 50" wide, for gas or oil fuel, for coiling and uncoiling strip under tension while being rolled to thinner gauges.

1—Delivery table, 38" wide x 136'6" long, with anti-friction bearings. Speed 900 FPM.

1—Coiler 24" dia., driven by 100 HP, 485/1200 RPM motor. Timken bearings. Air push-off.

1—Coil discharge gravity conveyor 70'4" long.

1—Main motor-generator set for supplying reversing motor; also auxiliary generators.

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CYRIL BATH

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#100- 8	8' x 3/16"	10' Bed
#100-10	10' x 8 GA.	12' Bed
#120-10	10' x 3/16"	12' Bed
#150- 8	8' x 5/16"	10' Bed
#150-10	10' x 1/4"	12' Bed

Purchasers of Cyril Bath Brakes are entitled to services of a factory representative to assist and supervise installation, and instruct personnel in operation and maintenance. NO CHARGE FOR THIS SERVICE.

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5—3500-KW, 3 Unit, Allis-Chalmers, Motor Generator Sets. Each consisting of:
2—1750-KW, 250/350 Volts parallel, 500/700 Volt series, 514 RPM, 5000 Amp., type HCC, rated continuous at 40 Deg. C. Allis-Chalmers DC Generators with Class B Insulation, separately excited, direct connected in the center to:
1—5000-H, 3730-KW, 13800 Volts (6900 volts), 3 Phase, 60 cycle, 514 RPM, 162 Amps., Allis-Chalmers Synchronous Motor with Class B Insulation, rated continuous at 40 Deg. C. Rise.
Each set equipped with a 40-KW exciter for synchronous motor fields, and a 10-KW exciter for generator fields, both 250-VDC at 514 RPM.
All mounted on a structural steel base approximately 27' long x 11' wide.
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3" National high duty upsetter, air clutch
3" Ajax upsetter, air clutch
1½" National upsetting and forging machine, hardened ways (2)
Economy Type R automatic threading or pointing machines, 1948 (2)
10½" x 10½" No. 3 Motch & Merryweather cold saw, late, MD
10" x 10" Racine hydraulic Shear-Cut metal saw
750 ton No. 3 National Maxipress, air clutch, new 1945
60 ton No. 600 B Perkins OBI press, new 1950
800 ton Model 2E48-800 Hamilton straight side single crank, air clutch
250 ton Williams White & Co. four post upward working hydraulic press
150 ton HPM Hydro-Power Fastraverse hydraulic press
350 ton No. 18T Cleveland single crank double action toggle drawing press
260 ton No. 795½-72 Toledo double crank toggle drawing press
200 ton 7-72" Bliss double crank straight side tie-rod frame press
126 ton Model 60-D-66 Cleveland straight side double crank tierod frame single geared press
600 ton No. 664 Toledo tierod frame knuckle joint coining press
400 ton No. EG 54 Ferracute upward working coining press
30" x 30" x 8' Cincinnati Hypro 2 rail, one right hand side head, dial feed planer
Economy type KK automatic bolt head shaving and pointing machine

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#30C-24 CLEVELAND, Double Crank, Gap Frame, Flywheel, 5" stroke, automatic oiling, M.D.

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1—15 ton Alliance Crane, 59'6" span, 230 V D.C., cab operated, 3 motor.

1—5 ton P & H Crane, 39'6" span, 3 motor, cab operated, 230 V D.C.

1—Steel Frame Building consisting of: one aisle 75' wide x 596' long, 73' crane runway for 100 ton Crane, one aisle 31' wide x 596' long with crane runway for 7½ ton crane, one aisle 60' wide x 596' long, no crane runway; included are one crane 7½ ton, 30' span for 31' bldg., one crane 40 ton cap. 73' span for 75' bldg.

1—48" Slitter, Stamco #5, 5" arbor, complete with DC motor, drive, pinch rolls, piling table, feed platform and accessories.

1—Strip Uncoiling & Shear Line consisting of: delivery conveyor, coil box, leveler & pinch rolls, hump table, Hyd. operated shear, Gauge table with elec. & hydraulic controls.

1—3 Stand United, 2-high, 10" dia. x 16" face cold rolling mill, complete with all electrical, motor-generator set, pay-off reels, upcoiler, coil handling trucks, pinion stand & drive.

1—42" McKay Leveler, 17 roll, and back-up rolls, roll dia. 2½", with motor & control.

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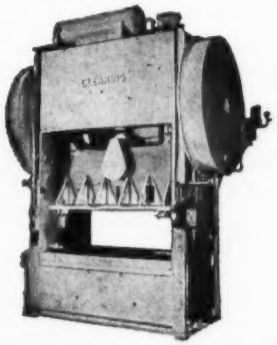

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No. 3 Haskins, pneumatic control, type 3 CAP
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2 spindle Haskins, pneumatic control, m.d.
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Gray Turret Head Metal Cutter, m.d.
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Model 4510-D Dreis & Krump "Chicago" Steel Press Brake
No. 5 Hilles & Jones Pyramid Type Bending Rolls
No. 1016 Wysong & Miles Power Squaring Shear, m.d.
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4 spindle 360° Cincinnati Automatic, m.d., 1944
No. 12M Morey, 2 spindle, m.d., 1943

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No. 15-25 Acme Saddle Type, m.d.
No. 1L Gisholt Universal, m.d., 1943
No. 1, 2 Cincinnati Acme Full Universal, m.d.
No. 1A Warner & Swasey, m.d.
No. 2F Foster Fastermatic, m.d., Timken
No. 2L Gisholt Universal, m.d., latest type, 1945
No. 3 Gisholt, m.d., 1942
No. 3A Warner & Swasey, m.d.
No. 3L Gisholt, m.d., 1942
No. 3F Foster Fastermatic, m.d., Timken
No. 4 Midland Universal Ram Type, m.d.
No. 4A Warner & Swasey Universal, m.d., chucking, 1939
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One Type 6 4233 CU Hevi-Duty Bill Furnace and Equipment. 125 KW, 440 V 3 Phase 60 Cycle with Inconel Retorts 50" ID x 70" High 2100°F Operating Temperature. New March 1955.

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One 3000 CFH Electric Furnace Co. Ammonia Dissociator Unit Complete with Controls. New 1955.

These almost new furnaces are available at considerable savings. For further information write

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MELTING FURNACES
3 KW AJAX Spark Gap Converter
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1½ Ton LECTROMELT Arc Melting Furnace
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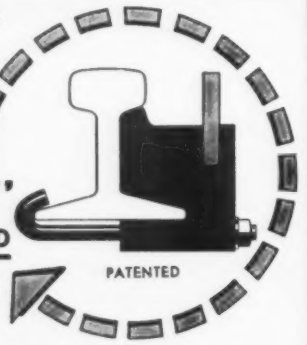

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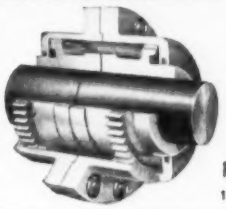

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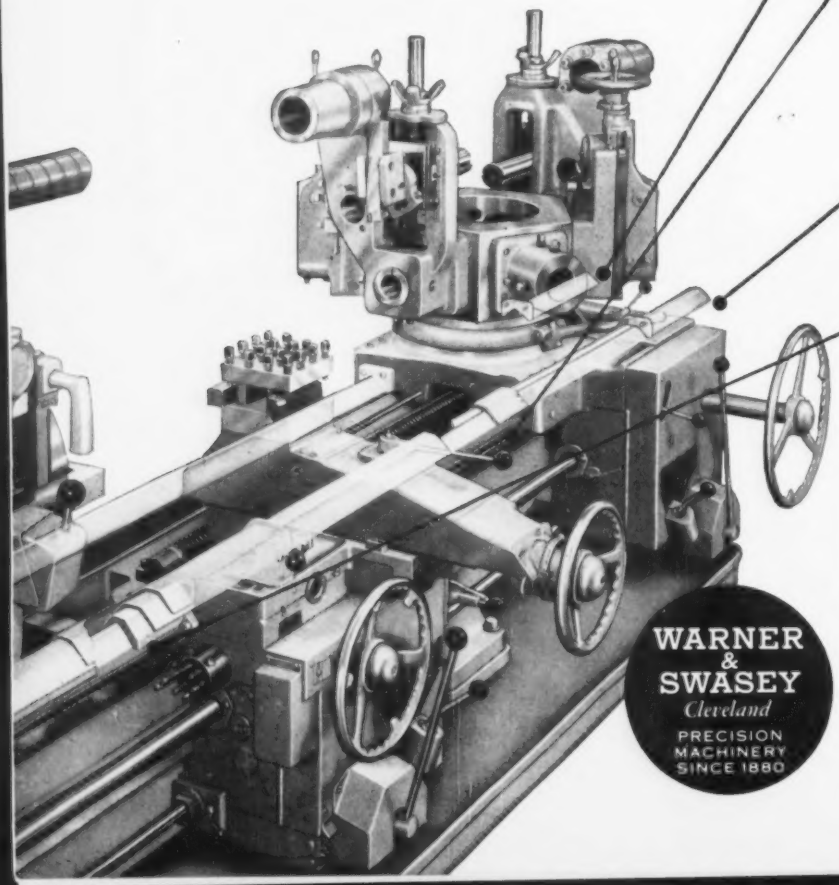

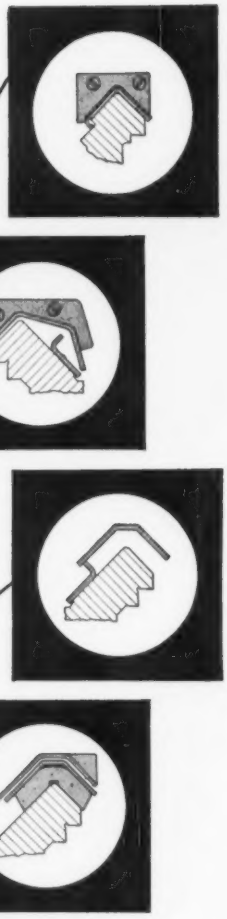

These patented way covers protect from accidental dropping of heavy objects. Chips cannot work between the ways and carriage or saddle units to damage important bearing surfaces. Also, lubricant is not washed away by flooding coolant or combined with dust and oil to gum up bearing surfaces.

Warner & Swasey's exclusive one-piece head and bed casting gives increased strength without increased weight. Its diagonal-rib bracing assures greater rigidity and accuracy. Vee-ways are induction-hardened and precision-ground to give greatest wear resistance and a long, accurate life.

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Cleveland
PRECISION MACHINERY SINCE 1880

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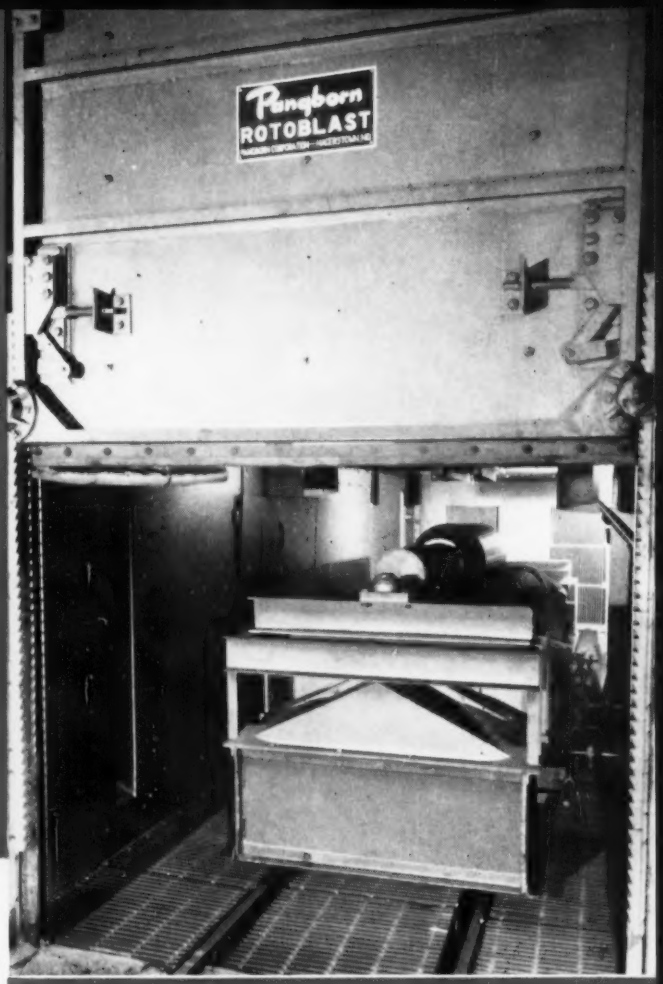
Mill rolls etched twice as fast with Pangborn Rotoblast®



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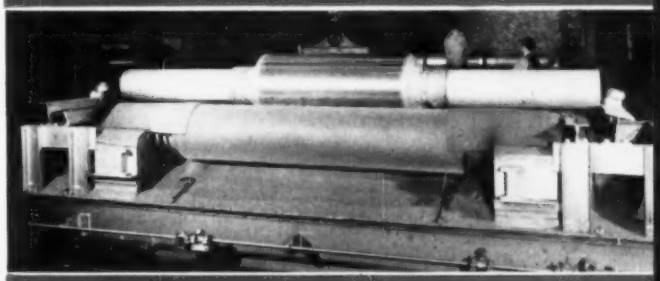

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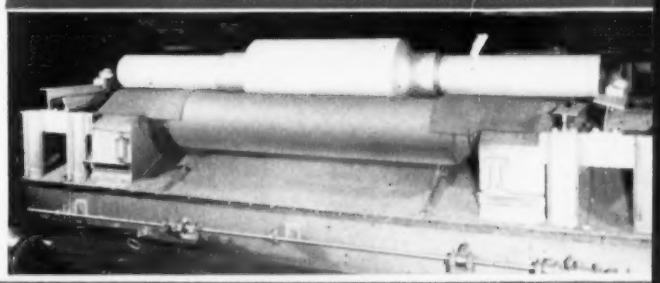

Faster and better . . . that's Pangborn's story for a leading steel producer. A year ago this mill replaced two air blast rooms—used for etching sheet machine rolls—with two Pangborn Rotoblast Roll Etching Machines.

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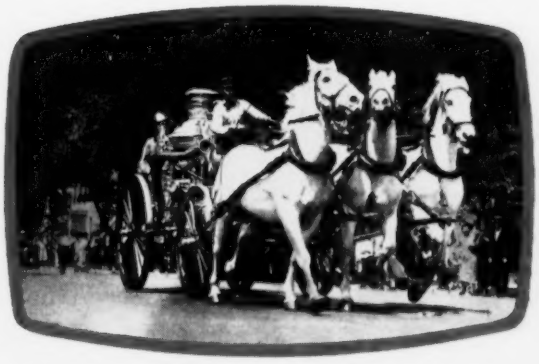
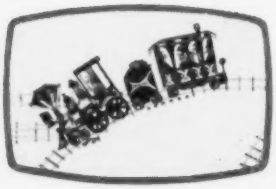


Over 142 NBC STATIONS, NOVEMBER 21st

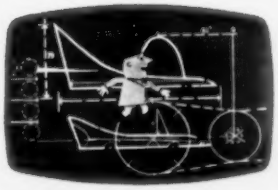
"The Innocent Years". Recaptured from exciting old films and newsreels, you'll see happy days relived. Experience the excitement of "Teddy" Roosevelt, Thomas Edison and Mark Twain in action. Hear songs like: "In the Good Old Summertime", "He'd Have to Get Out and Get Under". Enjoy the fun of family picnics, the joys of people in the last untroubled time in our history.

And commercials that help you sell . . .

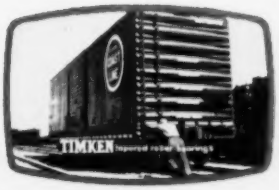
See How man stumbled on the concept of the wheel.



See Why America's railroads have always led the world.



See Why Americans jump for the latest thing in cars.



See One man push a freight car all by himself.

Years of national and trade advertising, backed by their superior performance, have made "Timken" the best-known name in bearings—a name that helps to sell the products that use Timken® bearings. Now, network television will build an even greater awareness of Timken bearings—make them an even bigger sales plus in the equipment you sell. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

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